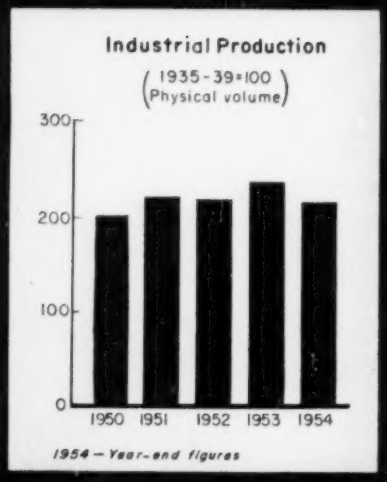
JANUARY
1954

DIGEST



U. S. BUSINESS—After an intoxicating ride with high good times, it's getting back to normal. The cycle has run from boom to superboom and back.....p9

SOFT SPOTS in the world business outlook for 1954 are normal enough almost to be reassuring. To strengthen them, every nation has its plan.....p12

COAL MINING's high expense bill can be trimmed if management looks carefully into "Cost-cutting at the Face".....p23

LOOKING for someone to fill a key spot in your organization? Chances are he is already working for you.....p32

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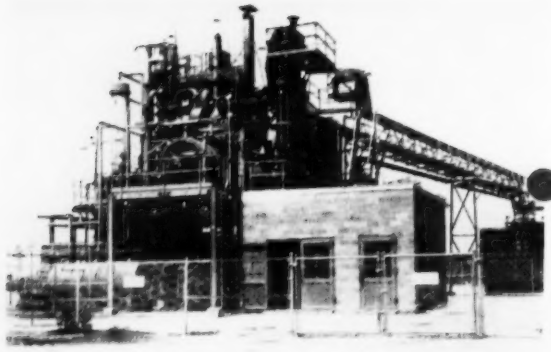
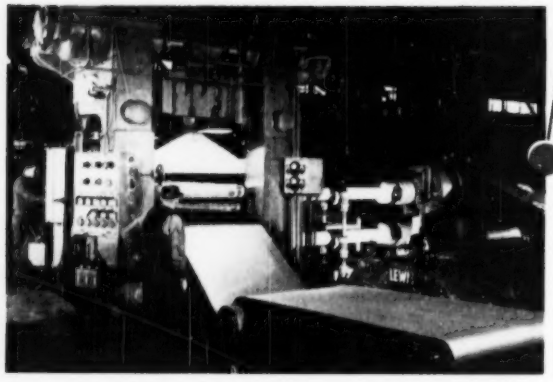
WHAT HAPPENS when machines get more complex than the men who run them? The human engineer steps in to save the day.....p42

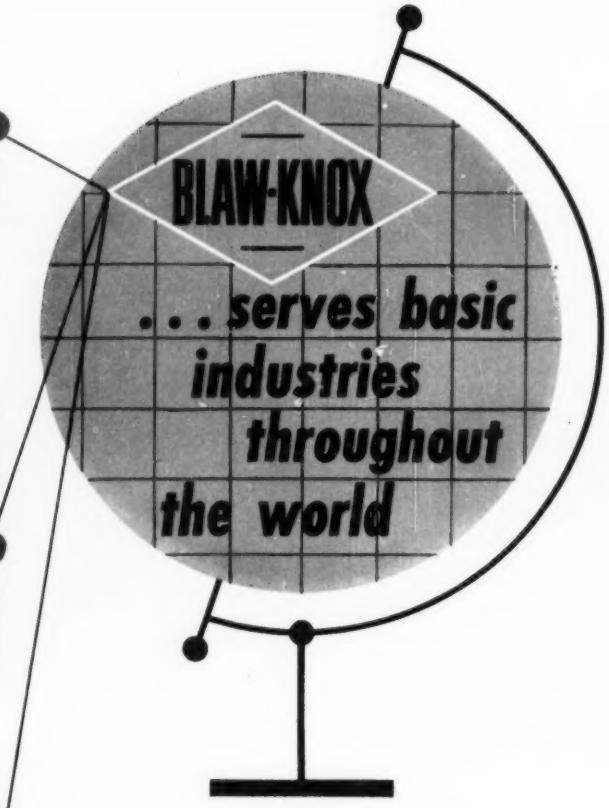


• Complete plants and equipment for the chemical industry

• Paving equipment for the construction industry



• Rolls and rolling mill equipment for the steel and non-ferrous industries



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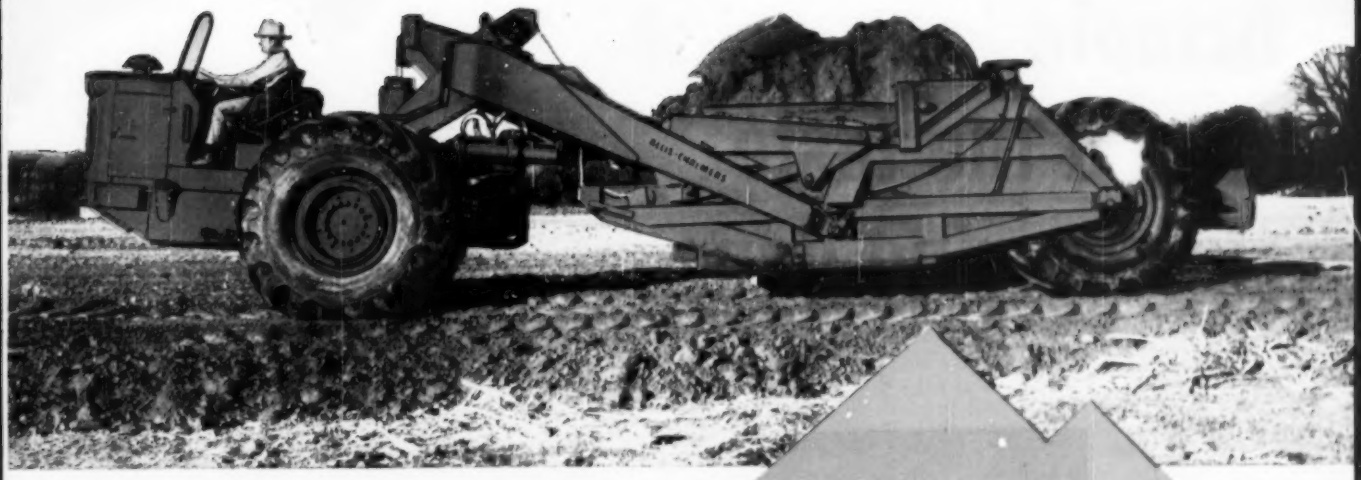
Allis-Chalmers TS-300 Motor Scraper
Huge, fast, this machine takes a 20-ton, 18-cubic-yard bite out of the earth quickly and moves it at speeds up to 22.5 mph. Compare size of scraper with man operating it.



This machine can move mountains...

Machines like the Allis-Chalmers self-propelled Model TS-300 Motor Scraper are helping to speed the construction of public projects — highways, dams, land leveling, housing developments — stimulating national progress and prosperity for the benefit of millions.

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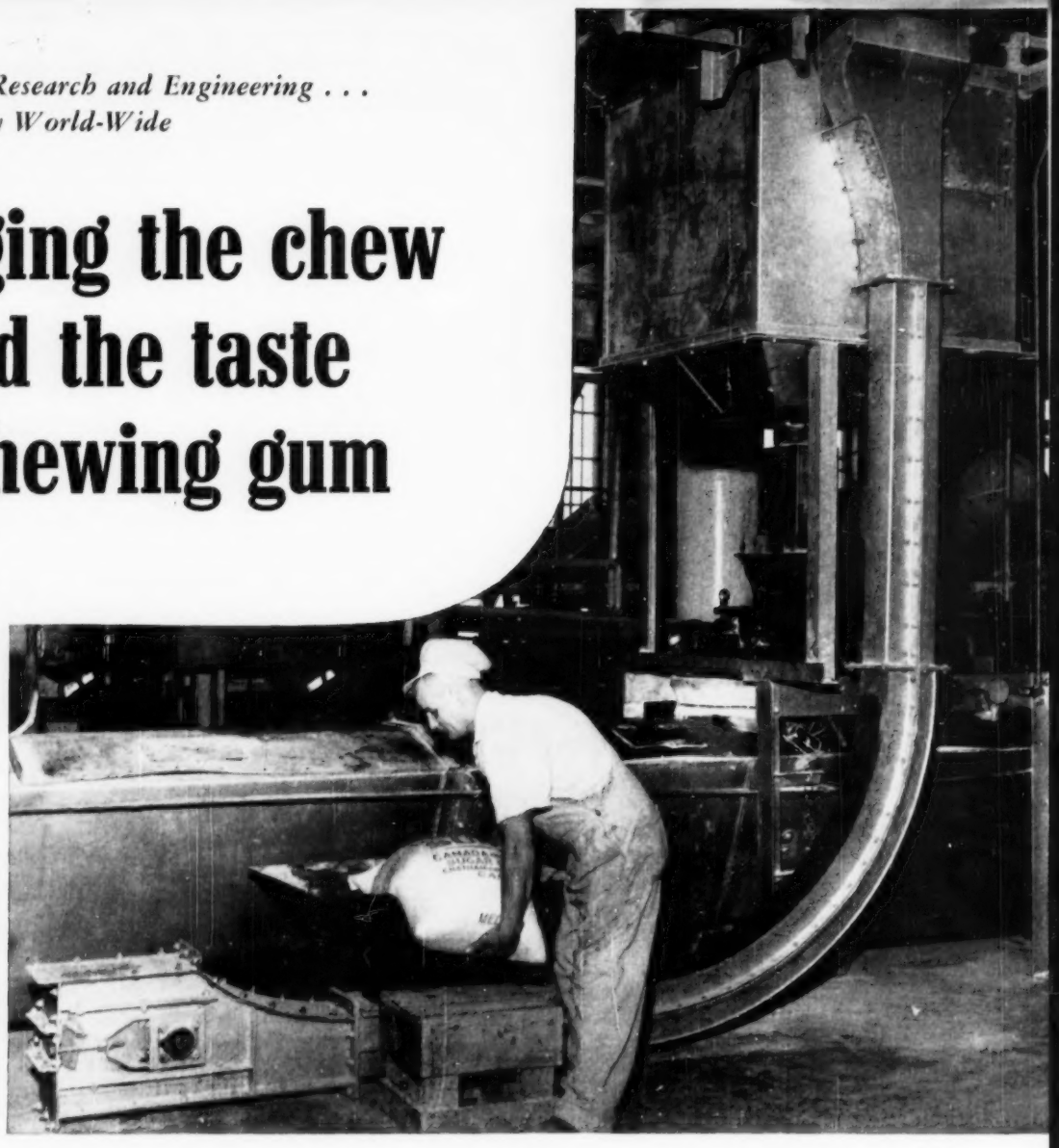

Compact, sanitary Bulk-Flo conveyor-elevator carries sugar to surge hopper that supplies the micro-grinder.

LINK-BELT Bulk-Flo and other conveyors handle Wrigley's ingredients at low cost

CHICLE from Malaya, sugar from the West Indies—these and other materials must be efficiently handled and blended to make high-quality chewing gum. At the modern Wm. Wrigley Jr. Company, Ltd. plant in Toronto, a Link-Belt conveying system provides the exact, high-capacity, sanitary handling required.

Here is another example of how Link-Belt products help produce almost everything we eat, wear and use in daily living. It's the same story in almost every industry—Link-Belt conveying, processing and power transmission machinery increases output, reduces costs, helps make America more productive.

LINK-BELT

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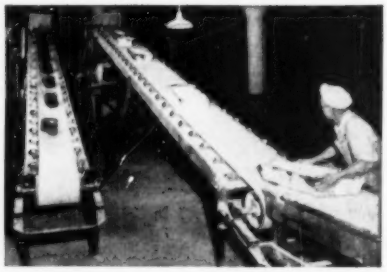

Link-Belt flat belt conveyors elevate basic materials. Link-Belt also supplied screw conveyors and power transmission machinery.

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El Salvador—Grace & Co., San Salvador
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January 1954 | McGRAW-HILL DIGEST | Vol. 9—No. 1

Member – Audit Bureau of Circulations

Published monthly by McGraw-Hill International Corporation for circulation in all countries of the world except the United States and Canada. *Publication office:* 99-129 North Broadway, Albany 1, N. Y., U. S. A. *Executive and editorial offices:* 330 West 42nd St., New York 36, N. Y., U. S. A. Donald C. McGraw, Chairman of the Board; Willard T. Chevalier, President; Eugene P. Warner, Senior Vice-President; Joseph A. Gerardi, Treasurer; John C. Cooke, Secretary; J. C. Stark, Vice-President Publications Division; K. Presbrey Bliss, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Director of Circulation.

Subscriptions may be ordered through Director of Circulation, through local book dealer, or McGraw-Hill Publishing Co. Ltd., McGraw-Hill House, 95 Farringdon St., London, E. C. 4 (British only). Subscription rates: $5 for 1 year, $8 for 2 years, or $10 for 3 years; single copy 50¢ (U.S. currency). Entered as second-class matter January 1, 1953, at the post office at Albany, N. Y., under the Act of March 3, 1879.

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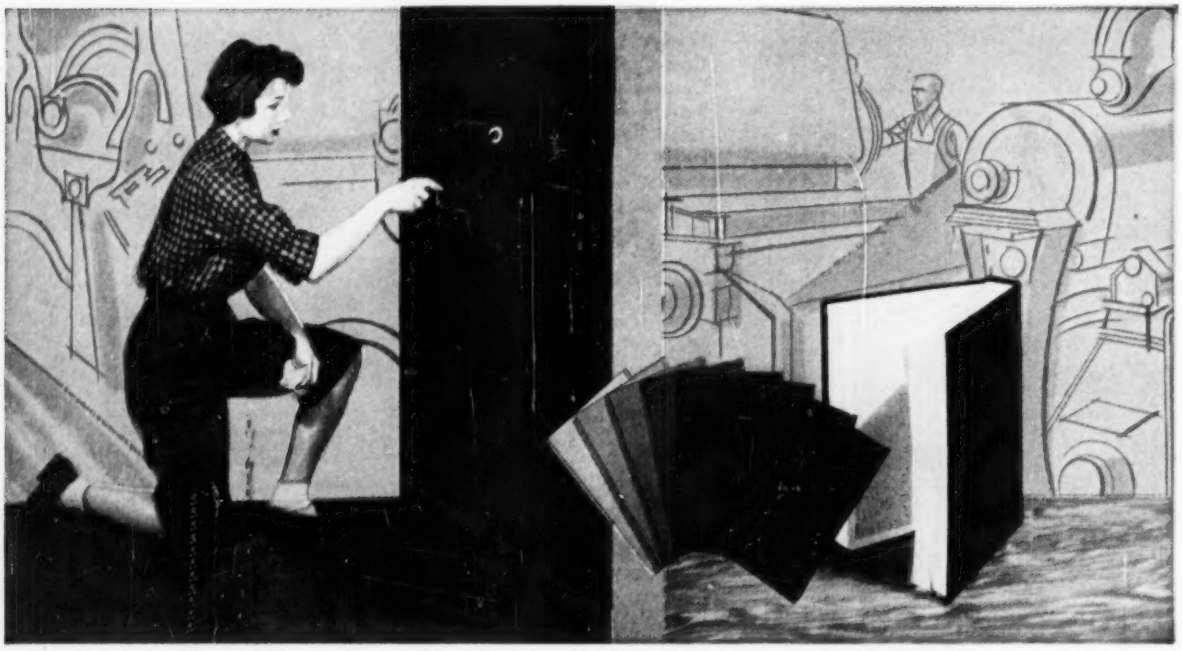
DOW LATEXES FOR THE PAINT AND PAPER INDUSTRIES

New and exciting latex materials create big markets for paints and printing papers



Improving the products of industry is the never-ending task of Dow's Research Laboratories. Today, industry is able to make new kinds of paints and finer papers because of Dow-developed latexes.

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BUSINESS TRENDS

MOST U. S. CORPORATIONS anticipate favorable earnings in 1954. Profits before taxes will fall 15% from the record $45-billion of 1953. But net earnings after taxes will make it the third best year ever registered. One-half of all firms figure on little change in sales volume. About 20% will increase their earnings, while 30% will experience a dip.

A striking shift will occur in the way corporate profits are to be distributed. The government will get a smaller share because of abandonment of the excess profits tax. As a result, net earnings will represent a larger part of national income in 1954.

Stockholders will suffer only a 4% decline from the $9.5-billion peak received in dividends last year. But payments to them will amount to a larger share of profits. Companies plan to plow back less of their earnings into new plants and equipment. To maintain the high pace of investment outlay, they will resort to surplus and reserves, as well as float more security issues.

Principal factor in the 20% rise in last year's earnings was the 1952 steel strike. Iron and steel profits skyrocketed 101% in the third quarter alone. Industries depending on steel also showed huge gains. For instance, mining and metals earnings jumped 58%. Steel executives say the expected 85% operating rate in 1954 scarcely will damage profits.

Airplane producers will record the greatest earnings improvement this year. Heavy defense expenditures will be concentrated on new planes and bases. Tax relief also will help aircraft manufacturers.

Food lines will become more profitable. Soft-drink business is anxious to expand markets at home and abroad. Utility, chemical, pharmaceutical, banking, insurance and rubber companies also have excellent prospects.

AMERICAN INDUSTRY is adopting more foreign techniques than at any time in history. Manufacturers are looking toward the future as a hedge against possible raw material shortages, higher costs, or even war. Here are some of the popular inventions imported from abroad:

- **A German shell molding** process for metal casting is used in many foundries here. Continuous casting as developed in Germany is being installed in U. S. steel plants. Republic Steel is studying the Swedish steel production method. This process saves 100 lb. of coke per ton of steel.
- **CinemaScope movie production** is a French patent. Chances are it will become America's leading type of film entertainment. The German Fischer-Tropsch process is common in the chemical industry.

Foreign patent applications should be filed in the U. S. without delay. They must be made here within 12 months after the patent has been requested in the original country. It is imperative to file applications before the patent is published abroad. Even if the invention process has been used, it is still possible to file in the U. S. on the condition it has not yet been published in the country of origin.

AUTOMOBILE PRODUCERS in Britain will break all records in sales of cars to U. S. and Canada in 1954. They are now planning an aggressive advertising campaign. Last year, their exports to North America amounted to $100-million.

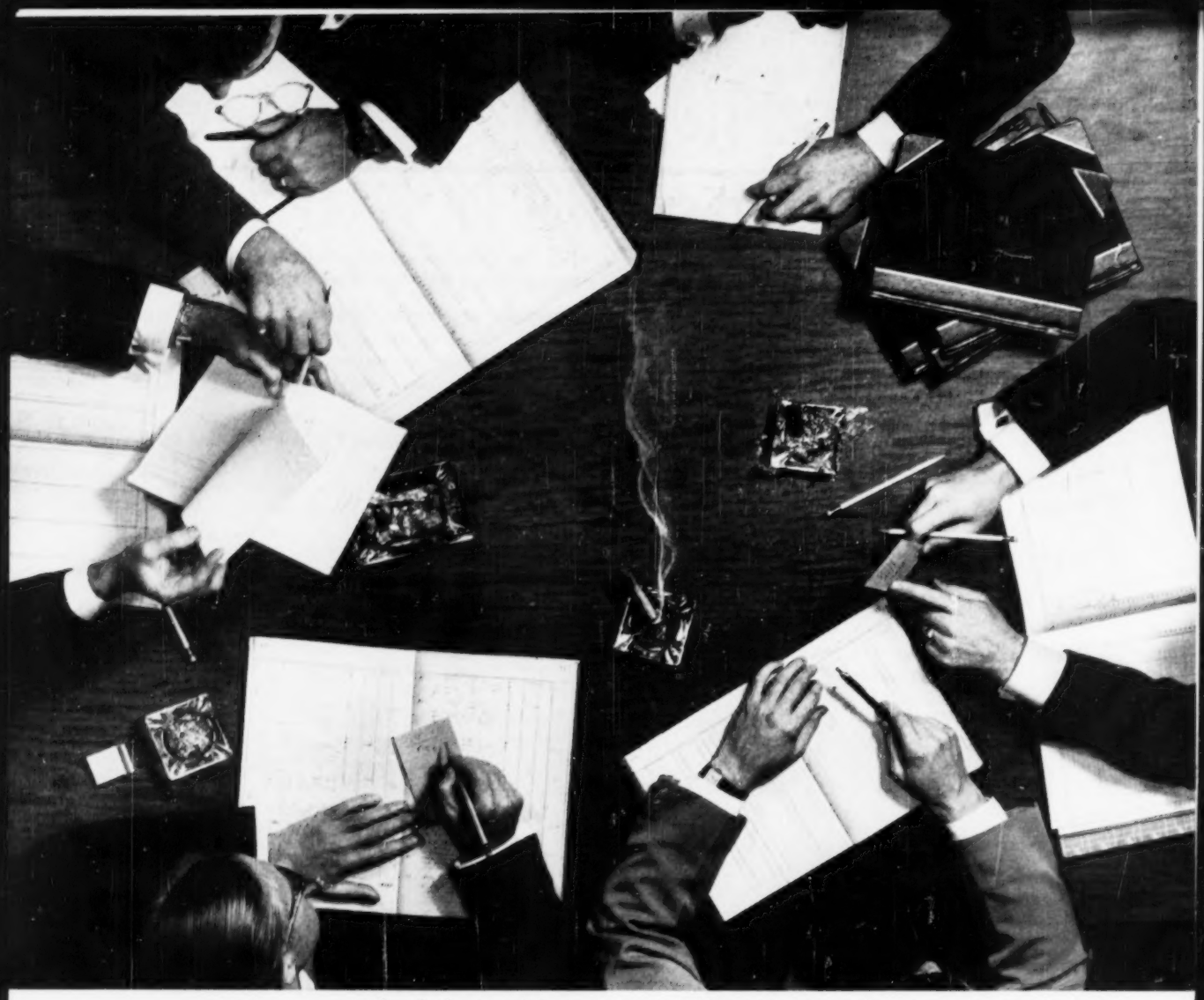
England's 1954 models have improved tremendously in design. Buyers will benefit from lower price and more space. Ford models will compete strongly with the German Volkswagen.

American companies are preparing to meet European competition. Two leading U. S. manufacturers—General Motors and Hudson—will promote small, speedy cars patterned after foreign designs. But the British will counter this move with a new low-priced model designed especially for the American market.

SUCCESSFUL STOCK SALE in the U. S. market by the Dutch company, Algemene Kunstzide Unie N. V. (A. K. U.), will encourage other firms to raise capital here. Wide interest is displayed in the first postwar offering of European shares.

A. K. U.—fourth largest producer of viscose rayon in the world—will now join Royal Petroleum Co. in the crusade to have Dutch-issued American shares listed on the stock exchanges here. A committee of New York Stock Exchange governors is weighing advisability of lifting the ban on Dutch shares.

Americans appear receptive to overseas securities. Other foreign firms, therefore, should study possibility of floating issues in this country. At present, only $2-billion of the $226-billion of stocks traded on the New York exchanges represents foreign shares.



When the directors of Droguería Surraco S. Ltda. got the balance sheet, it was almost too late to help

How could they plan with figures *5 months old?*

Five months were needed to prepare and present the yearly balance sheet. By then the figures were too old to assist in future planning.

Droguería Surraco S. Ltda., largest manufacturers and distributors of pharmaceutical products in Uruguay, called in the Burroughs man.

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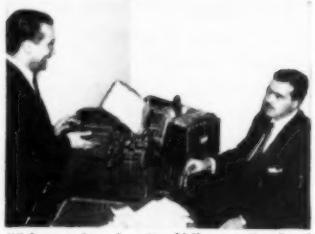

"It's paying for itself," says Sr. José Vilariño, Chief Accountant, Droguería Surraco S. Ltda., to Sr. Santiago Montesano, his Burroughs man.

Call your Burroughs man

WASHINGTON REPORT

REPORT ON LATIN AMERICA by Milton Eisenhower will have little effect on U.S. policy there. Dr. Eisenhower called for a strengthening of economic and cultural cooperation along present policy lines, no basic policy shifts.

But the present trend in the other direction will be hard to shift. Funds for U.S. information and cultural programs in Latin America were drastically cut this year. Export-Import Bank's lending operations have been curtailed by the Treasury Department. Pressure on Congress is growing for tariff and quota boosts on key imports from Latin America like lead, zinc, wool, oil.

Some strengthening of cultural programs is likely next year. But Treasury Secretary Humphrey will be hard to move in Ex-Im Bank policy. And the battle over trade barriers in the Randall Commission and Congress will be a nip and tuck affair.

What happens to the Eisenhower report depends on this: will he carry more political weight with his brother at the White House and Congress than Treasury Secretary Humphrey or the protectionist lobbies? Most Latin American experts doubt it.

ADMINISTRATION STRATEGY for getting high tariff Republicans on the Randall Commission to go along with some trade liberalization is getting clearer. Public members of the commission headed by Clarence Randall will push for agreement on the principle that domestic industries damaged by imports should get government help in readjusting to foreign competition. Then they will try to use this agreement as a springboard for making it tougher for U. S. industries to get tariff relief under the escape clause of the Reciprocal Trade Act.

This strategy might pay off. Congressional protectionists could even be brought to consider possibilities for compensating industries hurt by imports. Their demands for tariff protection would be weakened. At the very least the administration should be able to get agreement to hold trade barriers where they are while various schemes for compensating injured U. S. industries are studied.

Senator Millikin will be the main target of this strategy. His primary concern is defense of western mining and wool interests. He is not necessarily in favor of high tariffs in principle as long as these interests are protected.

The compensation to injured interests idea seems to be gaining ground. Most industries threatened by foreign competition still would prefer tariff protection. Officially they still refuse to consider direct subsidies. But many of them are sufficiently scared by the possibility of further lowering of trade barriers—or at least no further raising of them—that they are privately beginning to think of alternatives.

Meanwhile the President has laid down some ground rules for future escape clause tariff decisions. Boosts will be approved only if there is clear proof that the domestic industry has been injured by imports, not domestic competition, and only after study of the probable effects of a tariff increase on the U. S. market and prices.

BRAZILIAN EFFORTS to boost trade with eastern Europe is being watched by Washington. U.S. officials are not really worried yet. Any trade would be small, it would not involve strategic materials, it could not lead to dangerous Brazilian dependence on communist markets.

The only possible danger is this: the communists might try to use trade agreements as a lever to get diplomatic recognition. This would alarm the U.S. It would give communist espionage a new base of operations. It might weaken Latin American support in the U.N. So far though there is no sign that Brazil is toying with the idea of diplomatic recognition or that the communist governments are pressing it.

ANTI-TRUST POLICY is the subject of a Justice-State Departments' difference. State has drafted a number of schemes for settling the Iranian oil crisis. All of them would require the big U.S. oil companies to work closely with British companies in marketing Iranian oil. The companies would have to agree on prices, marketing quotas, production ceilings on Middle Eastern output. U.S. oil companies will not cooperate unless they get formal exemption from prosecution under anti-trust laws.

But Attorney General Herbert Brownell is against exempting the oil companies from anti-trust. Justice so far has refused even to drop the anti-trust case against them for past price and marketing arrangements in the Middle East.

The issue will go to the White House for solution. Chances are State will get its way in the final decision. But Brownell, whose political strength in the administration is growing, will not give in without a fight.

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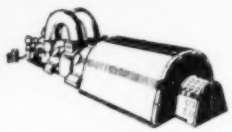
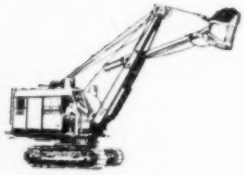


Electric Power Station & Sub-Station

Rolling-Stock



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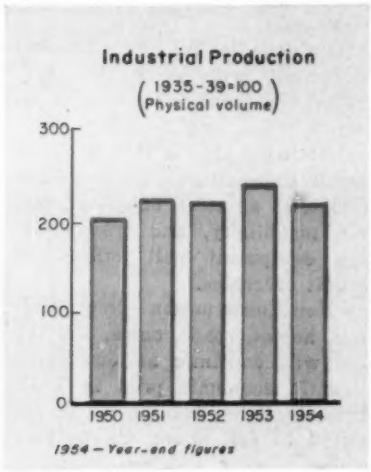
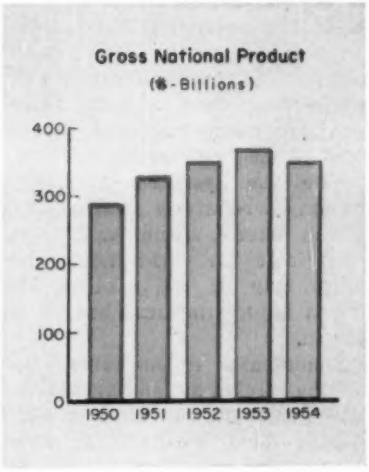
McGRAW-HILL
DIGEST

How the U. S. Business Machine Is Running

A Little Less To Make



A Little Less To Sell



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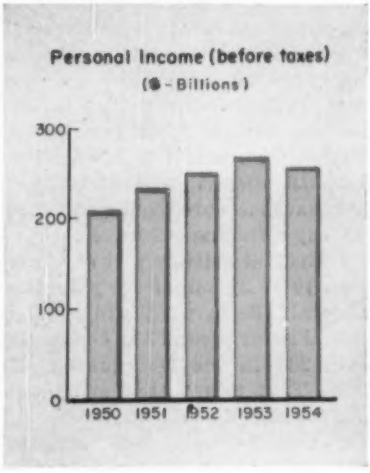
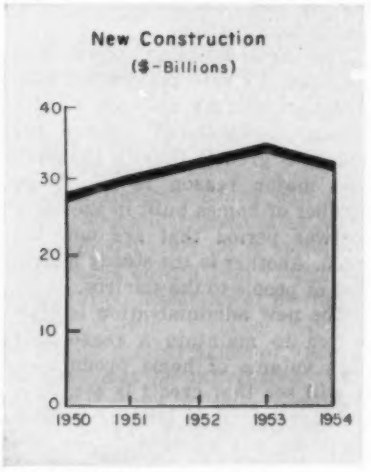
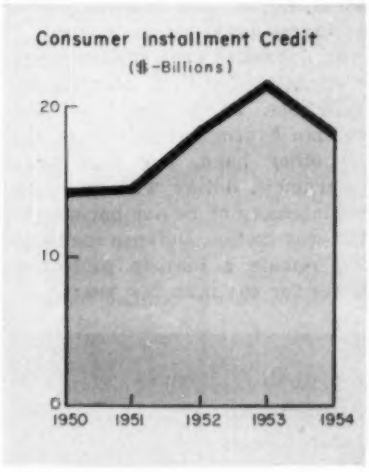


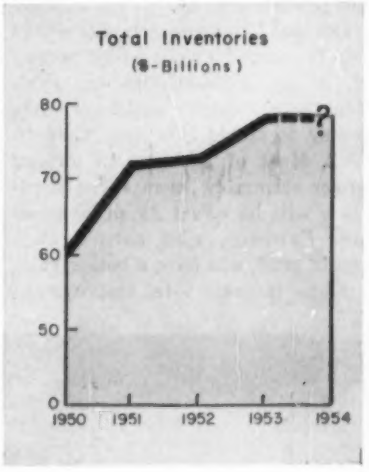
Going Down Slightly



A Good Sign



Could Be Dangerous



All 1953 and 1954 figures are estimates.

U.S. Business Outlook for 1954

Low rumblings can be heard and slight cracks are showing up in the U. S. business machine but don't start worrying yet—it's got a long way to go before it gets into real trouble.—An original Digest article

(The Outlook continues on page 10)

"Over-all business will remain healthy."

BUSINESS in the U. S. in 1954 will be the second best ever recorded. Despite certain weaknesses in the economy, America will not encounter a recession. But 1954 will go down in history as a "Year of Adjustments."

The end of the boom prompts the important question: how severe will the setback be? This reasoning is behind the world-wide concern expressed over the U. S. business outlook. There is no justification for fears. The Eisenhower administration is prepared to adopt necessary measures counterbalancing any softening influence.

Industrial activity will slip less than 10%. By end of the year, the Federal Reserve Board index should hover around 215, compared with 235 in the last quarter of 1953. That means that gross national product—total national output and services—will surpass $348-billion, which is only a 6% decline. Even in 1951—an excellent year—our gross product could not reach this level. So over-all business will remain healthy.

Personal income will dip about 5%. It jumped 7% to a new record of about $268-billion in 1953. Therefore, workers will have more money to spend this year than in 1952. Most of the loss in buying power stemming from reduced income will be offset by price trimming. Farmers, who earned 20% less in 1953, will have a better year.

Signs indicate total employment will not fall below 62-million persons. That will be only 2% less than last year's all-time peak. But jobs will be harder to obtain. Factory payrolls in the hard-goods lines will cause most of the loss.

The three key pillars of our post-Korean prosperity will be with us in 1954. It is unlikely that (1) defense spending, (2) plant expansion and (3) new construction will lose much of their strength. Their readjustment to normalcy should follow a moderate course.

• **Defense Spending**—You will see only a relatively small reduction in defense spending. Present plans call for $40-billion. The figure may be cut another $1-billion before the final budget is cleared.

Nondefense expenditures, including foreign aid and atomic development, will run close to $30-billion. This means that new Government spending of nearly $70-billion will continue to pump a tremendous amount of money into the economy. In addition, a $50-billion backlog of arms orders represents funds yet to be spent.

Do not count on a sudden spurt in spending for U. S. security installations as a result of the Russian hydrogen-bomb scare. On the other hand, our long-range government outlay will hinge on the intensity of Soviet hot-war or cold-war tactics. Defense spending will remain a built-in protective device for the next few years.

• **Plant Expansion**—This second leading support to business will be sustained in most fields in 1954. Only those industries closely related to defense will experience more than a moderate slide. The 5% drop that began in the fourth quarter last year will gain little momentum.

Capital outlay for new plant and equipment will be nearly $27-billion. This represents an over-all decline of 4%, or $1.2-billion. Automobile firms plan a 15% jump in capital expenditures. Such specific industries as steel, chemical, textile, machinery, and transportation equipment will suffer the largest decreases.

• **New Construction**—New buildings, homes, roads, dams, and the like will continue as our third gigantic economic prop in 1954. Actually, dollar volume can be expected to fall about 8% to $32-billion. Dollar volume in heavy construction will slip only 2½%. Commercial building, which rose sharply in 1953, will go on climbing. So will rail, gas and electric utility construction.

The home-building boom will continue. Private residential construction will dip only 5% to $10-billion. Replacement demand for houses is greater than in the past. One major reason is the large number of homes built in the early postwar period that are now too small. Another is the steady migration of people to the suburbs.

The new administration is committed to maintain a reasonably high volume of home production. It will see that credit is available for mortgages. If lending institutions do not provide funds, the government will initiate a stepped-up public housing program.

Consumer spending will be stimulated by three forces that will play a major role in next year's economy. Together, they will offset the $7.8-billion cut in defense spending, plant expansion, and new construction.

• **Tax reductions** will amount to $4.5-billion. An additional $2.5-billion of take-home pay, resulting from the 10% slash in individual levies, will go into spending

channels. Corporations will have a $2-billion windfall from elimination of the excess profits tax.

• **Public-works expansion** will be increased. Municipal and state projects will jump $2-billion to $29.5-billion. Spending for thruway and toll highways will reach a new level. Total cost of all highway building will be $6.5-billion.

• **Savings** of U.S. families will amount to only 5% of their income in 1954, compared with 7% last year. This means that they will put at least $2-billion more into circulation through purchases out of savings.

Bank accounts and liquid assets of Americans are at the incredible peak of $99-billion. There is no more accurate yardstick for measuring the impact of a business slump than the savings cushion. You can expect tremendous amount of cashable assets to tide most people over economic troubles.

Capital Investment Plans for Manufacturing Industries

(millions of dollars)

Industry	1953 (estimated)*	1954 (planned)**	Change - %
Steel	1,460	1,108	-24
Automobiles	923	1,063	+15
Machinery	899	805	-10
Electrical machinery	463	512	+10
Transportation equipment	215	196	- 9
Food	841	841	0
Petroleum	2,824	2,757	- 2
Chemicals	1,800	1,546	-14
Textiles	296	260	-12
Other manufacturing	2,969	2,595	-13
Total manufacturing	12,690	11,683	- 8

* Department of Commerce estimates

** McGraw-Hill Dept. of Economics survey

Two other less tangible elements —easier money and lower prices— also will help absorb any slack in consumer spending. Both will inspire a type of buying that was totally absent last year. Tight money and high interest rates have kept borrowing restricted to more or less necessary lending.

As business slows down, the Federal Reserve Board will ease credit. The government is as eager to avoid deflation as it is to put the brakes on inflation. The result will be loosening of mortgage terms. Lower reserve requirements of member banks of Federal Reserve may be anticipated. This step will make it easier for small businesses to borrow money.

The cost of living will hold steady for most of 1954. However, competition will provide the incentive to lower prices for some items. Consumers will benefit from reduced price tags on clothing, house furnishings, and many food products by the middle of the year. (Automobiles and appliances already can be bought for less.) This will encourage more nonessential spending in the second half of 1954. The effect of reduced prices, along with the administration's action to ease credit, may well start a business upturn.

There is no doubt that the boom has left us with several under-surface vulnerabilities. The first few months of 1954 will be the testing period. Readjustment must be gradual. If not, then a recession could be caused by: (1) excessive inventories, (2) durable-goods cutbacks, (3) accelerated consumer debt, (4) declining farm income.

Inventories at nearly $79-billion remain a real menace to the U.S. economy. Manufacturers' stocks climbed steadily in 1953 until they hit $46-billion—up $4-billion in 1 year. Virtually all was in durable goods. With the backlog of unfilled orders declining, there is little hope that 1954 will witness any large inventory liquidation.

The steel industry will operate around 85% of capacity for most of the year. This will permit some manufacturers to work off heavy supplies. Still lower prices for electrical equipment and metals, particularly lead, zinc, and copper, may help promote sales of other durable goods. People will be in the market for household durables as it is now 3 years since that phase of post-Korean buying ended.

High retail sales will prevent inventories from becoming too troublesome. Last year, total sales were up 6%, hitting a new record. Outlook for 1954 is about an 8% decline. In view of the 10% production dip, that should be large enough to keep goods from accumulating further.

Consumer installment credit skyrocketed $3.2-billion last year. It now stands about $21.8-billion. Although this is a huge debt for American installment buyers, there is no cause for immediate worry. But it could cause plenty of trouble if the U. S. economy plunges into a tailspin.

But the debt pace is tiring. People are becoming more cautious. This year, installment credit may drop by 15%. By the same token, the worst is over in the downturn of farm income. It has not upset the economy.

American business, to maintain sufficient consumer demand to avert a recession, must be sensitive to shifting trends in the 1954 readjustment. Stiffening competition and more effective selling will play a big part. So will labor-saving devices to reduce costs. New products, methods, and designs will appear in greater quantity in an effort to induce spending.

World Outlook for 1954

World business conditions are so closely knit together that executives must know what to expect in other countries. Here we bring to you the 1954 outlook for 18 countries.—An original Digest article

Europe

France

PARIS—Barring upsets at home or abroad, 1954 should bring a modest improvement in the French economic situation. Industrial production and business activity are likely to register small gains, prices and living costs may hold about steady, and foreign-exchange holdings should rise substantially.

Perhaps the largest single factor in the economic outlook is the assistance promised by the U. S. Current American aid, almost all in the form of dollar payments, enabled France, during the last months of 1953, to build up her foreign-exchange reserves. Prospects are that these reserves will continue to increase during 1954.

French exports still are too high priced to find ready markets abroad, and the experts still insist devaluation of the franc is inevitable. In all probability, the franc will be devalued this year. Successive French governments have resisted devaluation for more than 2 years, trying by export subsidies and tight import restrictions to achieve a foreign-trade balance. These efforts have been conspicuously unsuccessful.

Germany

FRANKFURT—Economic developments in Germany in 1954 hinge largely on two far-reaching developments: (1) Economics Minister Erhard's anti-cartel legislation and (2) rebuilding of private capital market.

Erhard faces a tough, bitter fight with German industry as he wants a prohibitive law—*all* cartels outlawed, with certain exceptions to be made if national interest is affected. But industry wants cartels permitted, with only abuses punished by the state.

For capital-market reform, Erhard is backed by industry. Basically, the reform would be relief from double taxation of dividends. Coupled with this tax reform are government plans to shift housing construction from public to private hands.

The German economy, including exports, has "levelled off;" no tremendous changes in either directions are expected for 1954. Production and productivity are at all-time highs; unemployment continues to drop; real wages are on the increase.

Italy

ROME—Economic indicators showed marked progress in Italy last year.

Agricultural production scored a post-war record and is about 9% above prewar averages. Industrial production is 10% above that of the last month of 1952. Consumption has kept in step with the rise in production, showing an average improvement of 5 to 10% over those for 1952.

But this progress cannot blind the observer to the persistence of negative aspects of the Italian economy: the trade deficit that last year reached the record figure of nearly $1-billion, unemployment of some 2.2-million persons, and a standard of living still below the prewar level.

For 1954, only a few things can be foreseen with certainty. Italy will encourage exports, such as by providing credit. She will also increase her already large imports of capital goods, especially of machinery for house and road building and for the chemical and metal-working trades. She will raise the living standards of her people and the rise in purchasing power will be accompanied by a rise in the already large volume of imports of consumer goods.

Sweden

STOCKHOLM—Swedes, both in business and government, are eyeing 1954 in a mood of uneasy optimism. The trade deficit in 1953 turned out to be only half that expected, and income from shipping remained high enough to improve the foreign-exchange account by 200-million kronor.

But this favorable situation is largely the result of a general reduction of inventory. Importers have held off buying; exporters have sold from stock. Thus stockpiles of Sweden's most important commodity, wood pulp, are again about normal. Less market pulp available from Sweden should mean better prices. Swedish lumber exports will also be down from the 1953 high, but more paper will probably be sold.

Other trends: a considerable increase in ship tonnage built for foreign owners; some improvement expected in exports of machinery and electrical equipment (Asea, which dominates in electrical manufacturing, is optimistic); textile imports expected to remain steady; greater domestic production of iron and steel, thereby cutting down imports. But the big cloud on Sweden's economic horizon is still inflation.

United Kingdom

LONDON—Last year could be called the "Year of the Great Return to Freedom." The Conservatives dispensed with an impressive list of controls:

- Grains were handed back to private buyers.
- Tea, sugar, candy, and eggs were derationed.
- Animal feed, rice, starch, linseed oil, and bananas were returned to private trading.
- Steel allocations have been removed.
- Foreign-exchange arbitrage between the U.K. and EPU countries was restored.

Two major controls remain—inconvertibility and capital-investment restrictions. We can expect no substantial movement toward convertibility of sterling on current account this year. And there will be little, if any, relaxation in investment controls, which require that any capital investment over £50,000 in a given year be cleared through the government's Capital Issues Committee.

All signs point to 1954 as a "Year of Little Things"—a little more freedom here, a little less discrimination there. This stability could last for more than a year. Much depends on the cold war and U. S. business conditions. If any big decisions are made in Britain this year, their effect will not be felt until 1955.

Latin America

Argentina

BUENOS AIRES—Argentine business in 1954 definitely will be on the upgrade. Gold and dollar holdings have experienced a sudden comeback and are now at a 6-year peak. Purchases from the U. S. will increase about 15% in 1954 as a result of some loosening of import controls.

Restrictions on heavy equipment and machinery especially will be eased. This is necessary because of Peron's new $4-billion capital investment program.

With one of her best harvests in history last year, Argentina's exports will continue to climb. Trade with Eastern Europe will be emphasized. Russia's urgent need for food makes Argentine products especially attractive. The Soviets will sell more gold to pay for Argentine goods, as they did in 1953.

Brazil

RIO DE JANEIRO—One certain thing about Brazil's economic future this year is its uncertainty. All rests with the success of the new exchange policy (the Aranha Plan), which is hoped to halt inflation, increase exports, restrict imports, expand agriculture, and keep the country out of debt.

Exports are improving. Coffee is gaining, cotton continues high, and cocoa prospects are brightening with better prices expected.

On the import side, curbs will continue. Emphasis will be on imports of basic consumer goods, fuel, raw materials for agriculture, and machinery for transportation and power development. Equipment for plant expansion is considered less essential.

Production rate depends on power and raw materials. Materials can be imported, but the power shortage will be more difficult to solve. Greater generating capacity due this year should increase production near the end of the year. Employment is no problem.

Living costs will rise this year as import prices increase. Eventually increased production will push general prices downward. But Brazil's long-term conditions are not too encouraging—as long as her oil wealth is undeveloped and the dollar drain for petroleum products continues.

Colombia

BOGOTA—The recovery of large areas through the suspension of guerilla warfare and the opening of new agricultural land through irrigation will increase Colombia's agricultural output in 1954. Rice

will become a major export commodity, and coffee growers expect that they will have 5.7-million sacks available for exports.

Exports are expected to increase in 1954, while imports will remain stable. The government is releasing more and more goods from the list of prohibited imports and hopes to reach complete freedom of imports within the licensing system.

In the industrial field, Colombia is still a good country for investments though tax increases decreed last September have hit the higher-income brackets hard. Industry will be able to expand further in 1954 and will have more funds available for dividends.

Last year brought a general increase in prices, and the seasonal drop from May to September did not occur. Further increases are to be expected during the next 6 months. Some fear that increased government expenditure this year will produce an inflationary trend.

Mexico

MEXICO CITY—Mexico finished up 1953 with a slight slow-down in business; for 1954, the outlook is cheerful.

Inflationary trends of the previous government, which spent money high, wide, and handsome on public works, have been stemmed. The Mexican economy has been steadied, where it was previously heading for disaster in the form of uncontrolled inflation.

Mexico imported $462-million worth of goods in the first 9 months of last year, but it exported only $347-million (cotton, minerals, coffee, fruits, fish). Thus the trade deficit for 9 months was $115-million.

Mexico, for the last 5 or 10 years, has covered its annual trade deficit with invisible exports—principally, the tourist business. But the tourist business is off at least 10%. So Mexico may, for the first time in recent years, emerge with an annual deficit, but it can be easily absorbed by its dollar and gold reserve.

This year will be a test year. It will hinge on a reversal of the tourist slump, a revival of local business conditions as they find the present government is loosening the purse strings again on public works, and a continued good market in the U. S. for Mexican lead, zinc, cotton, and green winter vegetables. Barring a slump north of the Rio Grande, 1954 should be a good year.

Peru

LIMA—The trend in business and industry for 1954 looks good. On the dark side are the continued unfavorable trade balance, causing a scarcity of dollars and depreciation of the sol; the higher cost of living, up 14% last year; and the drop in exports.

The business picture is brightened by the continued investment in mining; petroleum development under the new petroleum law, which has brought in many U. S. companies; the government's highway and irrigation program; increased industrial production; and, what is most important, a free economy and a free foreign-exchange market that permits foreign investors to take out profits without red tape.

Domestic business is active and local industries are constantly increasing production to keep up with a growing market. Importers are looking toward Europe for trade because of exchange trouble with dollars. The Europeans, particularly Germany, are offering easier terms and better prices.

Venezuela

CARACAS—The only shadow on the bolivar-bright horizon of Venezuela's economic future is the possible U. S. restriction on oil imports. With no restrictions, Venezuela will continue to have one of the soundest economies in the world and be celebrated in latter-day legend as the land where immigrants can rise from push-cart peddlars to millionaire chain grocers in 10 yr.

Neither the vast government construction program nor the less spectacular but equally sweeping private building boom has reached even a leveling-off stage. And U. S. capital is pouring into Venezuela, which, according to a recent Washington census, is the favored site in South America for the dollar.

Venezuelan iron production and the opening of the vast Orinoco basin to trade and development may have a decided impact on the national economic situation this year when the Orinoco Mining Co. (U. S. Steel Co. subsidiary) installations are complete. Iron-ore shipments are scheduled to start this month.

Asia

India

BOMBAY—With domestic trade prospects brighter than at any time since Independence (August 1947), Indian business and industry look toward 1954 with confidence. Reasons for this optimism include:

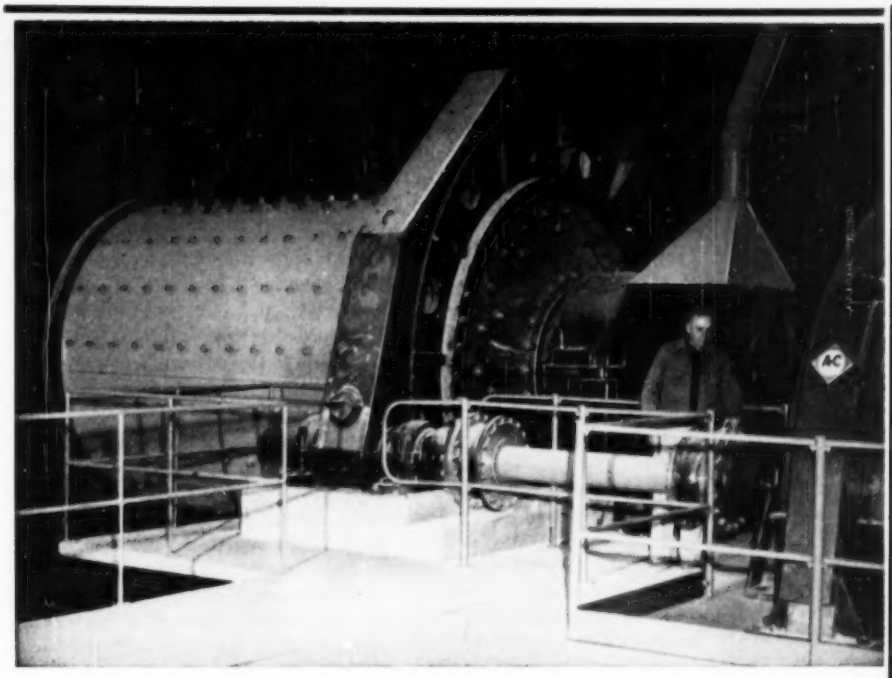
1. **A good harvest,** combined with a considerable stockpile of wheat, is bringing food prices down and will increase purchasing power for consumer products.
2. **India's trade,** now linked with the U. S. instead of Great Britain, continues to produce a favorable balance of payment.
3. **Uncertainties** of taxation of private business should be eliminated in 1954 with the report of the Taxation Inquiry Commission.
4. **India** is again veering round to encouragement of private enterprise. A committee is investigating the possibility of greater bank financing for industrial development, and the Indian Commerce Minister Krishnamachari is pursuing a scheme to set up a $1-billion investment finance corporation to help private business pioneer in new industrial fields.

Indonesia

DJAKARTA—Indonesia expects a considerable expansion in her trade with the sterling area, China, and other Far Eastern countries. Fewer oil shipments to the Western countries compel the Djakarta government to seek new ports behind the Iron Curtain.

Growth of Indonesia sugar markets once again will offset reduced sales in petroleum, rubber and tin. Tea, timber and kapok exports will increase in 1954.

Indonesia plans to raise sugar production to 700,000 tons annually by 1957. Recent agreements with



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Poland, Yugoslavia, Hungary, and Czeckoslovakia all include sugar. Other farm output also will be increased. Aid to small industries is contemplated, and greater incentives for foreign investment will be designed.

Japan

TOKYO—U. S. spending or aid to Japan, plus Japanese politics, will weigh heavily on its economic developments in 1954. These will determine whether present trends will continue or be reversed.

At present, Japan appears to be going the wrong way. Its economy is dominated by inflationary factors: rising prices, increasing nominal consumer income, rising production, bigger budgetary deficits. Special U. S. dollar earnings offset these conditions, which are holding down Japanese exports, by making it more attractive for industry to sell in the domestic market rather than meet the increasingly tough competition in world markets. U. S. spending in Japan this year may be in the neighborhood of $800-million if things go as planned.

If the U. S. decides to limit its dollar spending in Japan, as some U. S. officials are advocating, then Japan's foreign-exchange reserves will begin dwindling at a rapid pace. But it might also bring into being a stronger conservative government that would take some steps to bring about economic stability.

Pakistan

KARACHI—Prime Minister Mohammed Ali has outlined a three-point program of economic development that he hopes will lift Pakistan out of its post-Korean War crisis:

1. Stimulation of agricultural output to give Pakistan a substantial food surplus by reconversion of acreage back to wheat.
2. Raising industrial production to conserve foreign exchange.
3. Increasing exports of raw materials.

Pakistan now has enough textile units, in the western sector, to clothe the entire population while jute mills are going up in East Bengal. The government has undertaken major hydroelectric projects, has encouraged the setting up of U. S. automobile-assembly plants, and is cooperating with foreign oil companies in exploration schemes.

A rigid import policy, economy at home, and an all-out effort to combat the shortage of consumer goods through a stepped-up domestic production—these appear to be the main facets of Pakistan's economic policy in 1954.

Philippines

MANILA—Philippine efforts this year will be intensified to have the Philippine Trade Act rewritten by the U. S. Congress before July 4 or at least to have its vital second phase postponed. If nothing happens before that date, American goods entering the Philippines will begin paying duties and so will Philippine sugar entering the U. S. Rates of duty will be stepped up over a 20-year period until they reach general tariff rates applying in both countries.

Philippine Central Bank Governor Miguel Cuaderno's threat that he must devalue the peso if this happens must not be taken too seriously. But Cuaderno's hand may be forced if export prices drop too far.

Ramon Magsaysay's election to the presidency will pave the way for the return of economist Salvador Araneta, who broke away from the Quirino administration even before Magsaysay did. Araneta is an advocate of a bold lending policy for national development. Inflation may get worse if Araneta becomes economic boss.

Balance-of-payment problems will persist throughout 1954 or may get even worse. There is little hope for relaxation of exchange and import controls.

Africa

Union of South Africa

JOHANNESBURG—This year will likely prove a difficult one. The acute shortage of capital continues unabated in the face of needs of new mines and power, transportation, and other services. Rationing of capital will continue.

General business activity is likely to slow down to some extent, but a major setback will not occur. The cost-of-living spiral is still upward, but cost-of-living allowances have now been finally pegged, which should have deflationary effect. At the same time, severe restrictions on importation of consumer goods has an opposite effect.

The bulk of imports will be for capital goods, but the decision to abolish dollar discrimination throws available markets open to world competition. South Africa's foreign-exchange position toward the end of the year may improve as new gold mines and uranium recovery plants swing into greater production. Import quotas for the second half of the year may be stepped up.

The basic economy could be changed overnight by an increase in the world price of gold. This would bring boom conditions and abolish all restraints on trade.

Australia

MELBOURNE—Australia has just passed the period of moderate optimism regarding her future. At present, the optimism here is more obvious and its degree much higher.

The slight recession is definitely over and the forces of inflation have been subdued, at least for the time being. The private-enterprise federal government of R. G. Menzies has just announced a new "incentive" budget that has found favor in the eyes of nearly every Australian.

Company taxation has come down from 45% to 35%, individual taxes have been lowered by 12½%, and some indirect taxation has been abolished or substantially lowered.

Business was quick to respond with the renewal of previously postponed or shelved expansion plans. But these plans are proceeding cautiously as next June's Federal Parliament elections may bring the Labor Party back into power.

Production costs, sore point to many Australian industrialists, may enable foreign competitors this year to score at the expense of Australian producers and exporters. This trend is definitely under way although the recent virtual freezing of wages will now enable more careful long-range planning.

This Month's How To . . .

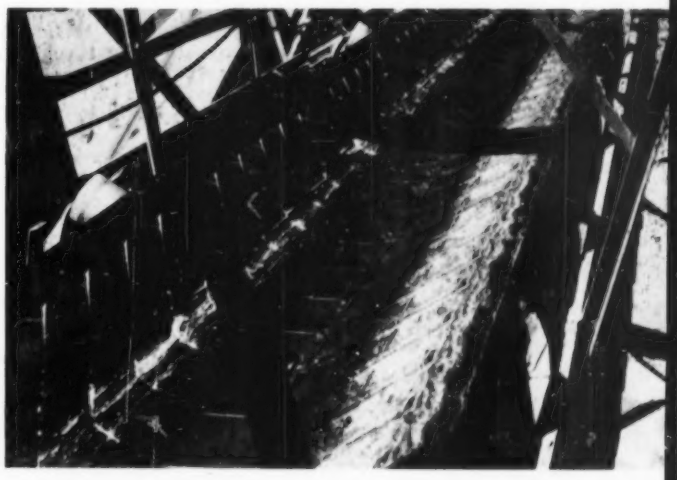
. . . sell hardware by "serve yourself"

Lighting Fixture and Supply Co., San Antonio, Texas, recently set up a new supermarket type of service for customer's convenience. At the same time, they are saving money for themselves. The heart of the system is a series of display islands containing 126 different items. Electricians wheel carts around them and leisurely pick up what they want. They pay at the check-out counter.

The whole serve-yourself system costs less than $500 and is saving approximately 4 man-hr. a day for each clerk because they no longer spend time hunting stock to fill orders.

One electrical contractor voices the general feeling: "My time is worth $8 an hr., and if I can come in and shop in a third the time, I'm going to like it."—Elec Whols, Nov, p90

. . . make conveyor shed or retain water



This rubber conveyor belt, made by B. F. Goodrich Co., can shed or retain water from the material being handled. Originally designed for gold dredging use, it successfully handles wet cement, sand, gravel, and similar products.

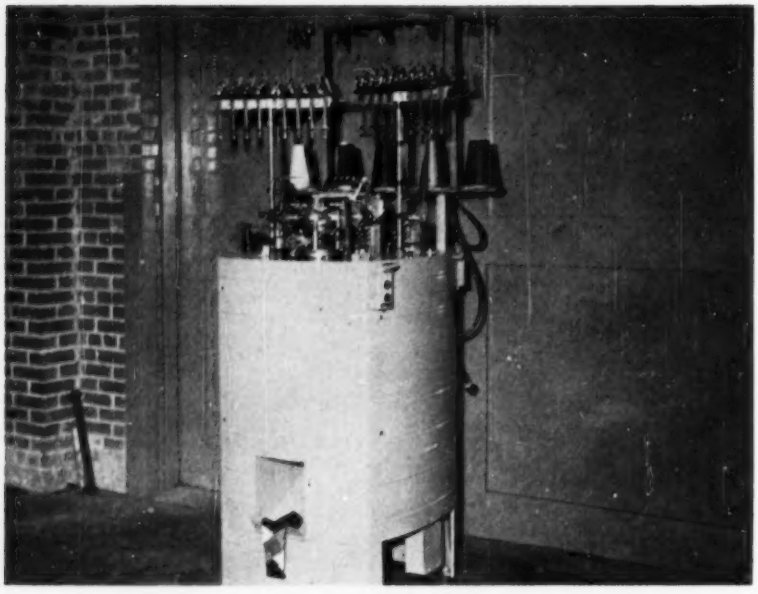
Secret of the belt's performance is its unique cover design. Molded rubber ridges, ⅛ in. high, are formed in a chevron pattern. The chevron ridges, with the belt at a predetermined incline angle and belt idlers at a specified angle, channel water to the edges of the belt.

Adjusting incline and idler angles changes chevron pattern into horizontal ribs that retain water on the belt. They also allow even distribution of water throughout the material.—Iron Age, Oct 29, p110

. . . beat the cold weather

Preheating before starting a cold engine in the dead of winter eliminates costly delays on those frigid mornings on the job. Priester Construction Co., Iowa, takes no chances with this crawler crane used on a building erection contract.

The Herman Nelson portable heater was wheeled out over the icy ground to the crane. Two flexible ducts direct heated air across the power plant inside the cab. Gas engine-operated, this forced-air blower-type space heater can be used anywhere on or off the job. After the crane engine is running, the heater can be set up to blow heated air into a construction area to keep men and materials warm.—Const Meth & Equip, Nov, p43



Hosiery Machine Features High Production

New circular-hosiery machine built by Keller Machine Co., Athens, Ga., is a radical departure from conventional hosiery-machine construction. Its features have been aimed at high production of argyle socks. Three and one-half dozen 168-needle argles have been knitted in 8 hr. Its pattern scope, however, covers a range of hosiery style wider than argyles. Elimination of troublesome parts and use of four-feed knitting speed up production. Versatility is possible with five-step cylinder. Other unconventional features include: (1) improved sutures in pattern, (2) no switch cams, (3) centrally displaced cylinder, (4) no pickers or droppers, (5) no raise cams, (6) individual drive.—Textile World, Oct, p104

Paper Coating Pigments Must Fill Exacting Job

When paper is made, it is coated with finely divided minerals to improve its printability, reproduction, and appearance. This has been done for many years, but present methods and coatings are a far cry from the time when coating colors were applied by hand.

Most common coating pigments are clay and calcium carbonate; others include titanium dioxide, lithopone, satin white, and barium sulfate.

Clay, the most widely used pigment, is available in a number of varieties. Calcium carbonate, second to clay in tonnage, is a relatively inexpensive source for high brightness, opacity, ink receptivity, and smoothness. A broad range of particle sizes that will cover practically all paper requirements is available.

Titanium dioxide and lithopone also increase opacity and brightness. The dioxide gives more opacity for the amount of pigment than any other white pigment, but price is high. Barium sulfate gives brightness and opacity, but it is being replaced by cheaper pigments. Satin white imparts a high gloss, but it too has been largely replaced as a result of improvements in other coating materials.

One outstanding requirement of a modern pigment is uniformity, which is well met by synthetic calcium carbonates. Its importance cannot be over-emphasized because present trends toward high coating speeds, automatic controls, high solids coating, greater press speeds, and a larger number of impressions leave less room to adjust for variation in raw materials. As these trends continue and down-time losses become more significant, uniformity will increase in importance.—Paper Ind, Oct, p783

Boring Mill Features Unit Construction

Large boring mill built by British Thomson-Houston Co., Ltd., has exceptional flexibility. The column units of the machine are arranged on a series of floor plates around the table unit and can be rearranged as required to accommodate the work being machined. To handle extremely large work, the main column can be mounted on the table and rotated.

The machine is equipped with a central boring bar, side tool ram, and a milling head to permit as much machining as possible at one setting. Additional machine tools, such as radial drills, can be mounted on the floor plates or rails surrounding the table.

Accurate indexing is provided by a graduated steel tape in a groove machined around the periphery of the table. An optical system sights on the tape and reflects onto a vernier scale below a sight glass sunk in one of the floor plates.

As the position of the main column can be adjusted on the floor, mechanical interconnection with the main table is impracticable. So an electronic motor control was developed to synchronize speeds and feeds.—Mach, Oct 3, p1641

Chemical News Abroad

▶ **Pakistan**—A $13-million fertilizer plant to be built at Daudkhel will be finished in 1956. Designed by Union Chemique Belge S. A., Brussels, the plant will produce 50,000 tons of ammonium sulfate per year.—Chem Wk, Nov 7, p22

▶ **Japan**—Ministry of International Trade and Industry and five companies have drafted plans to increase Japan's acetate-fiber production 16-fold in 5 years. Hoped-for net gain in foreign reserves will be $50-million.—Chem Wk, Oct 31, p28

▶ **Brazil**—Oil from shale, 10,000 bbl. daily, is the production target for a distillery planned for the Taubate-Tremembre region. Foster Wheeler Corp., New York, will build it for the National Petroleum Council, Sao Paulo.—Chem Wk, Oct 31, p30

Solves Water Problem In Deep Mine Shaft

Kennecott Copper Corp.'s Deep Ruth shaft on its Pine County, Nev., property ran into a heavy flow of water at 520 ft. After careful study it was decided to place a concrete plug. This was done by placing 19 1-in. pipes vertically in the shaft and filling the surrounding voids with washed aggregate to a point 18 ft. above the bottom of the shaft. Grout was then pumped through the pipes until it reached the top of the aggregate.

Next, the water column above the plug was pumped out. An attempt to install a grout curtain behind the logging to seal off seepage above the plug was only partially successful. A second plug was then placed above the first to seal the section of the shaft where it was impossible to construct the curtain. Water was again pumped down to the top of the plug.

To strengthen the ground above the plug and reduce seepage to a minimum, a 15-ft.-thick grout curtain was constructed around the rectangular cross-section of the shaft. When this was finished, grout holes were drilled to extend the grout curtain 15 ft. below the bottom of the first plug.

Both plugs were then removed with paving breakers and light blasting. The grout curtain was again extended, this time to a total of 30 ft. below the first plug. Sinking operations were resumed with a cycle of drilling and grouting.—Eng & Min J, Nov, p94

Steel Frame Pipes Hot Air

Hollow steel columns and beams plus cells in the steel deck serve as heating ducts in a new Seattle, Wash., building. This eliminates exposed duct work. And there is some radiant-heating effect, resulting in more uniform heat distribution. Local Seattle building code does not require that the steel members be fireproofed.

Three of each four cells in the steel floor decking are used for wiring. Every other fourth cell is a heating duct. Hollow columns and beams are made of four plates welded at the edges.

Boiler installation is on the roof. Hot air is blown down through columns into the hollow beams. Slots, 3 × 10 in., cut into the beams permit passage of the air into the hollow floor decking.—Eng News-Rec, Oct 29, p43

Inspection Is Automatic

Automatic checking of the level in beer cans is performed by an electric level indicator in the San Francisco Brewing Co. plant. As the cans pass along a conveyor after leaving the automatic filling machine, the curved spokes of a wheel, moving at the speed of the can, dip down into the can about half an inch. There is a pair of electrodes on the end of each spoke. If the contacts dip in beer or foam, the can is properly filled.

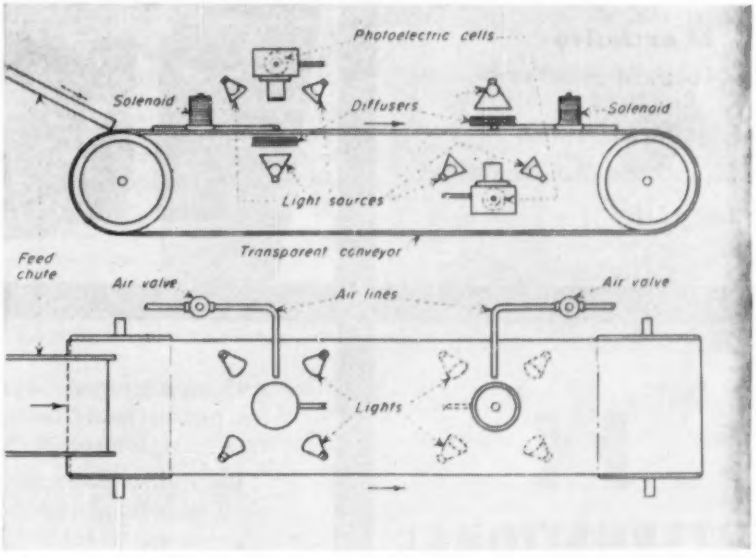
If no contact is made in the 24-v. operating circuit when the electrodes are lowered into the can, a solenoid operates an air valve and the can is air-blasted out of the fast moving canning line.—Elec West, Oct, p95

Build a Superhighway Over Existing Railroad

A Ford executive has made an interesting roadbuilding proposal to the National Project—Adequate Roads Committee. George J. Crimmens, director of dealer relations and business management, suggests that the committee seek the cooperation of railroads for building expressways over existing railway rights-of-way.

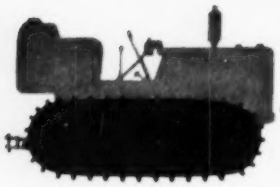
He reasoned that the high cost of new highway construction might be greatly reduced by building elevated expressways over existing railway tracks or surface expressways on rights-of-way adjacent to existing tracks or in place of underground tracks.

Crimmens pointed out that railroads already have excellent existing routes fanning out from metropolitan centers to residential sections and that use of such rights-of-way would eliminate costly condemnation and destruction of property and relocation of sewers and other public utilities.—Auto Ind, Sept 15, p19



Transparent Belt Improves Color Sorter

A transparent conveyor belt made of acetate sheeting makes it possible to inspect such foods as nuts and beans from both sides simultaneously. Two photoelectric inspection stations are enclosed in light-tight boxes having apertures and lenses. Reflective-light sources surround the boxes. On the opposite side of the belt are background light sources and ground-glass diffusers to stop conveyor reflection. Photocells control air ducts that blow unwanted materials out of conveyor line.—Food Eng, Nov, p155



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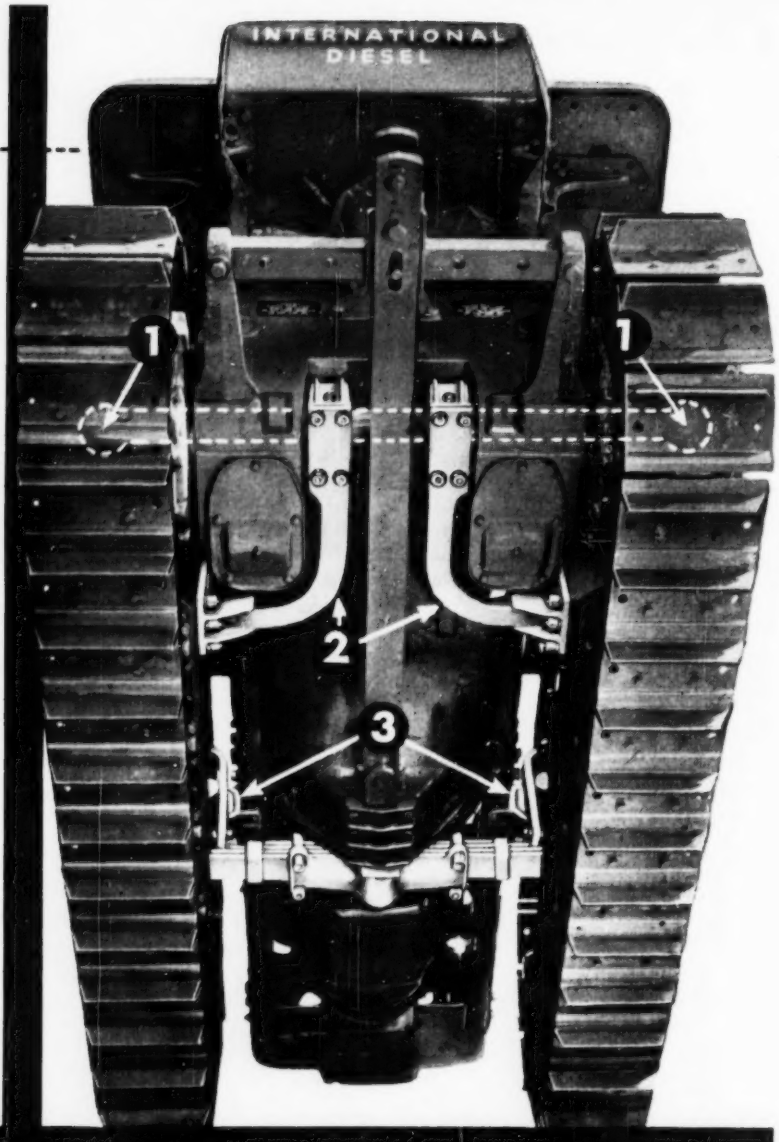

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Lower-Cost Canal Linings

U. S. Bureau of Reclamation engineers study canal-lining problems with cost-cutting methods in mind. Here are some of the Bureau's new ideas

NEW CONSTRUCTION METHODS, greater mechanization, modification of designs, and liberalization of specification requirements have cut cost of linings for irrigation canals. Laboratory and field work by U. S. Bureau of Reclamation engineers have come up with some new ideas in canal lining.

No one type of lining appears lowest in cost or most satisfactory for all locations. Canals need linings to cut seepage losses and erosion. This is best done at lowest cost with a newly developed "heavy compacted-earth" lining. But suitable earth material must be available within an economical hauling distance and the job must be large enough for effective use of large earth-moving and compaction equipment.

Asphalt membranes, both sprayed-in-place and prefabricated, have proved to be low-cost and satisfactory in the control of seepage. But they usually require a protective cover that governs their erosion resistance.

Portland-cement concrete linings long considered best for irrigation canals have been lowered in cost by elimination of reinforcing steel and the development of slip-forms for more economical placing.

A properly constructed heavy compacted-earth lining has been found by actual field tests to be highly impermeable; losses are about 0.07 cu. ft. per sq. ft. of wetted area per 24 hr. This loss is comparable with the loss from a good concrete lining.

In areas where high ground water or expansive soils are predominant, heavy compacted-earth lining may be preferred. Its greater weight and flexibility make it less liable to damage from these forces.

Investigations and trial installations using sprayed-in-place asphalt membrane began with the placing of a relatively thin membrane of asphalt cement over the prepared canal subgrade and leaving it exposed to the weather. It was easily applied but sufficient bond with the subgrade was sometimes impossible to obtain. In addition, the membrane did not have adequate life serviceability. So the membrane was covered with as stable a natural material as was economically available. This type of construction, called buried asphalt membrane, proved satisfactory as well as cheap.

The low cost of sprayed-in-place asphalt membrane lining is not possible on jobs too small to utilize the minimum-size tank car or truck of hot asphalt direct from the refinery. Therefore prefabricated asphalt membranes have been developed. They are supplied to the job in rolled sheets usually 36-in. wide. Most are about ¼-in. thick. Such materials are applied in the same manner as a buried sprayed-in-place membrane.

Indications are that seepage may thus be adequately controlled on the small job at a cost only 15% above that for the sprayed-in-place membrane on the large job. It is likely that a large demand may be developed in small irrigation operations or among individual farmers.

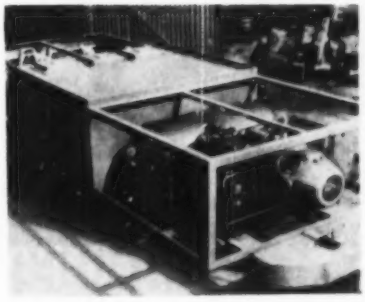
Recently developed is a heavier prefabricated asphalt canal liner designed to be used without a protective cover. Tests of this new material are underway.

A 1948 survey indicated that unreinforced concrete lining functioned equally well as steel reinforced lining. Elimination of reinforcing steel resulted in a saving of some 20% of the total cost of the lining.

Slip-form machines operating on rails have proved effective in cutting costs of lining large canals with concrete. But such equipment is not economically practical for smaller canals and farm laterals.

With the elimination of reinforcing steel a small slip-form could be supported directly on the previously prepared subgrade. This newly developed equipment—called a subgrade-guided slip-form—combines a forward skid plate shaped to fit the canal, a rear screed, and a middle hopper open to the subgrade bottom and side slopes. Concrete dumped into the hopper oozes out over the canal perimeter and is struck off, consolidated, and troweled by the rear plate as the slip form is dragged forward.

Concrete for most of these small slip-forms has been mixed and supplied by transit-truck mixers. In some instances where air-entrained concrete was used, batches have been hauled in dump trucks from a central mixing plant. Other jobs have employed highway paving mixers that operate alongside the canal and move forward with the slip-form to supply it with concrete.—Eng News-Rec, Nov 5, p35



Cuts Lubrication Costs

Perry Coal Co. designed this "Mine Lubrovan" to satisfy a need for a more efficient and safer method to lubricate underground machinery. Unit is all steel, mounted on conventional mine-car wheels. Air compressor, powered by a d-c motor, is mounted at the rear, adjacent to a cabinet for tools and special equipment. Ahead of the cabinet are three built-in steel tanks for high-pressure grease, hydraulic fluid, and oil. Also included are two air-motor-operated lubricant pumps. Pumps are connected by short hose lines to spring-actuated automatic-retracting reels.—Coal Age, Nov, p114

There's a Bright Outlook For Industrial TV Use

Makers of industrial TV see things opening up this year. Despite high hopes last year, sales did not go as high as expected, possibly due to steep prices. These have been adjusted downward as more companies began full production. This year cameras will cost about $2,000 and Vidicon tubes have come down from $500 to $345.

With these reductions have been a few new uses, some rather strange. One company recently demonstrated that the equipment could be used in a butcher shop to show shoppers at the counter cuts of meat in the refrigerator.

The military is also using it in war games. Cameras at the front relay pictures back to those in command, thus giving them views of the whole battlefield at once.

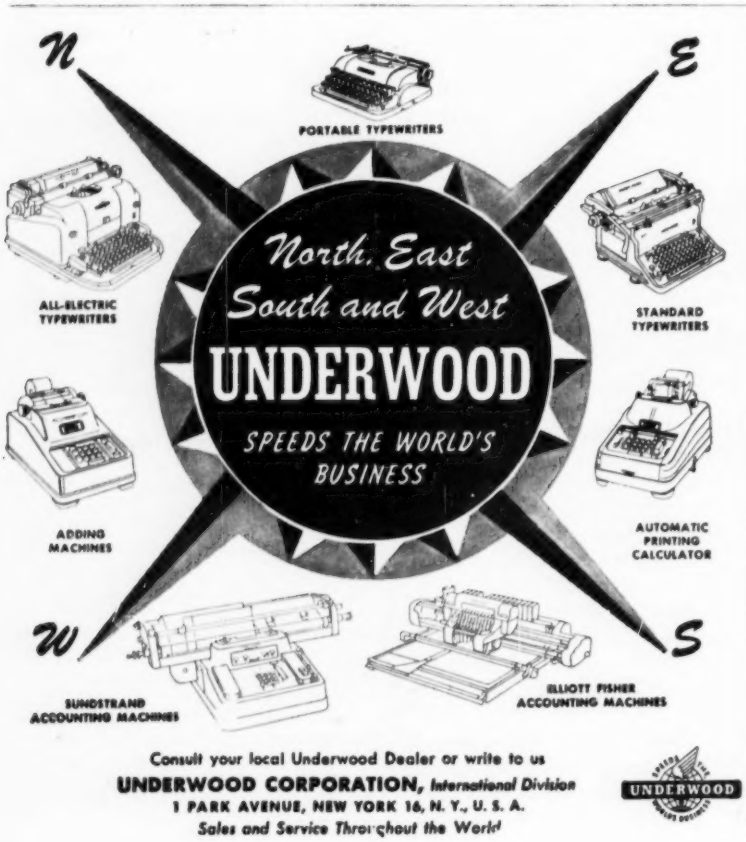
Perhaps the most unusual application made recently took place in Hollywood, California. There the equipment was used to detect a gang of theives in the act of pilfering the stockroom of a Radio Corp. of America television service branch. The camera, concealed in the rafters and focused on the loading platform, gave Hollywood police watching a receiver in an upstairs room a front-row seat.—Electronics, Oct, p20

Bright-Nickel Plating

Extremely bright finish at low cost is claimed for Hanson-Van Winkle-Munning Co.'s new Nickel-Lume process. Other advantages include good leveling properties, wide temperature and current-density ranges, good corrosion resistance, complete control, and stability.

Equipment suitable for ordinary nickel plating is satisfactory for the new process, which utilizes either of two baths—one for general use with moderate mechanical agitation, the second for high-speed air-agitated operation.

The process is recommended wherever a bright, smooth, protective nickel coating is needed on steel, zinc, brass, copper, and aluminum.—Iron Age, Oct 1, p44



Hydrazine: New Aid To Water Treatment

Hydrazine compounds are the latest entry into the water treatment field. These newcomers in this field prevent corrosion from dissolved oxygen. Though not widely used yet in the U.S., some compounds have been used with excellent results.

Hydrazine hydrate ($N_2H_4 \cdot H_2O$) has been introduced into feedwater in high-pressure boilers up to 1,400 lb. per sq. in. gage and dihydrazine sulfate ($N_2H_4)_2 \cdot SO_4$) has been used for low-pressure industrial-plant boilers.

Still another hydrazine compound, dehydrazine phosphate ($N_2H_5)_2 \cdot HPO_4$), is being used in England to lay up idle boilers. This service developed from experimental pilot-plant studies with hydrazine compounds in an idle boiler, filled completely with top water containing 6.4 ml. per l. of oxygen.

Tests showed that the stoichiometric requirements of hydrazine to remove available oxygen, plus 25% excess, gave excellent protection from corrosion that was due to dissolved oxygen.—Power, Nov, p91

New Packaging Films

Two new food packaging materials have been developed by General Electric Co. and the Plax Corp. Experiments are now being carried out to ascertain possible uses for the films. G. E.'s material is irradiated polyethylene that is bombarded with high-energy electrons. Thus, properties of the plastic have been changed, most importantly its resistance to high temperature.

Whether this modified "poly" can be used as a plastic "can" for thermal-processed foods is not yet known. But processors may find it suitable as a coating for paperboard trays for partially-baked rolls or other foods reheated in the same package.

The Plax film is a two-directional oriented styrene recently developed in W. Hartford, Conn. It is reportedly rigid and highly resistant to moisture.—Food Eng, Nov, p194

Sharp bits in the proper pattern on the longest possible bar lead to high-capacity cutting

Conserving high-cost underground labor through preassembled bolts and keyhole bearing plates cuts cost

Cost-Cutting at the Face

Smooth face operation—getting the coal down, loading, and moving it to the main line—is the key to low-cost mining. But you will need good management, trained personnel, a well-designed plant

IF YOU WANT to cut face costs, the first thing you must do is organize. The drive for lower costs must originate with top management. The natural follow-up is the application of the special talents of the accounting, purchasing, engineering and operating departments. They will determine what can be done, what will be done, and how to go about it.

The resulting program should look something like this:

1. It will define the system of mining and the types of equipment to be used.

2. It will recognize the fact that increased mechanization shifts the responsibility for high production partly away from the operating department and toward the maintenance department.

3. It will include selection and training of face supervisors who determine the fate of the program through their ability and enthusiasm. Without their cooperation, the program is doomed to failure.

4. It will contain provisions that will insure adequate power at the face, maximum safety, effective ventilation, good drainage, and smooth supply handling.

The program's aim: keeping the nose of the loading device growling in a pile of well-prepared coal and smoothly moving the coal out after it has been loaded.

High-capacity machines, operating on a smooth cycle and manned for highest possible tonnage, are the keys to profitable mechanized mining. If you have high-capacity machines, you must also have high-production mining methods. A sufficient number of working places and streamlined services all the way back must be provided if the installed higher capacity is to mean anything.

If a study of the elements of face preparation show too many instances of "waiting for the cutting machine," you have several ways to turn:

- Add another cutting machine. But this is a last resort because it will complicate the schedule and increase the size of the crew.
- Replace the present machine with a new one of higher capacity.
- Work over the present machine to see what can be done to increase its capacity.

Coal-cutting speed is the important measure of a cutting machine's capacity. Top speed demands rated voltage at the commutator, a straight bar, an unviolated lacing pattern prescribed by the coal being cut, sharp bits, and expert operation.

Bits are a fertile field for investigation into possible higher capacity. New developments are constantly appearing. Experimentation may be well worth the time and effort involved if you can practically eliminate bit-changing time, reduce cutting time by as much as 40%, and cut bit-cost per ton.

These are the first steps toward increasing capacity. You can go still further. Conditions permitting, you might be able to widen working places, especially with planned roof-bolting as an aid. Or you may be able to go to longer cutter bars. They will increase tons per fall without excessively increasing actual cutting time. Thus machine moves or interrup-

What Makes a Low-Cost Face Cycle

1. All crew members are busy but not flustered.
2. The section shows good housekeeping—an indication that necessary service work is not neglected.
3. The foreman moves around with a purpose. He knows what goes on in each of his working places and he has a production goal for his unit shift.
4. Openings are driven straight and true, working-place width is consistently maintained, and reasonably-smooth ribs are evidence of first-class workmanship.
5. Roof support follows a definite pattern.
6. The section mechanic is busy but relaxed. He is maintaining, not repairing his equipment under pressure.
7. The transportation system handles production as long as the loading operation is ready, willing, and able to proceed.
8. Rock dust is close to the face, dust-control sprays are working effectively, safety posts are placed without orders.
9. Strict compliance with mine law and company rules is evident.
10. One or more mine-developed ideas are in use to increase efficiency or improve safety.

tions in the loading operation where conveyors are used will be cut.

If drilling is the bottleneck, you can raise drilling capacity by investigating the advances in drilling tools and techniques. These advances range all the way from better hand-held drills through post-mounted units and on to mobile drills with multiple drill arms.

Shooting may be the culprit. Tight coal may delay the loading operation. Pinpoint investigation of both drilling patterns and coal-breaking media is necessary to get improved loadability.

The use of face machines of matching capacity will provide a good start in setting up a balanced operating cycle. But for lowest-possible costs, other factors must also be taken into account if the balance is to be maintained hour-by-hour, shift after shift.

Where steep pitches are a problem, long-hole drilling may permit keeping the men out of the coal and bring about increased productivity, higher recovery, and greater safety. Slant-chute methods reduce the manual labor and time required to haul supplies up steep places. Where moderate pitch prevails, rooms along the strike with shuttle-car or conveyor transportation to downpitch gathering units are recommended.

Longwalling, too, is coming to the fore in permitting recovery of areas not economically minable by other methods. Getting a good start at the beginning of the shift is another aid to high productivity. Getting off to a running start depends upon effective supervision, both in operation and maintenance.

Mine management is responsible for maintaining smoothness in the cycle. Making a continuous estimate of the situation is a useful supervisory device for maintaining balance in the cycle. Changes in natural conditions or substandard performance in any of the face-preparation elements, for example, must be detected rapidly and compensated for. Alert supervision like this leads to lowest-possible face costs.

How many men for the job? There is no rule but there should be enough men in a machine-mining crew to keep the cycle in balance—and no more. How can manpower requirements be tightened up? What are some of the possibilities?

Conserving manpower is an exercise in adopting new materials and new machine developments. That is one approach. It also includes making changes in operating methods where study shows the work can be done with fewer men under the new methods. Here are examples:

Cycle elements may be combined. As an example, a flexible-shaft or hydraulic drill, designed for operation from a power take-off at the cutting machine, provides an opportunity for combining the cutting and drilling operations.

Discharge stations for shuttle cars may be streamlined. In track mining, automatic car spotters or robot locomotives may be set up for push-button control by the shuttle-car operator. Where belt haulage is used from the room-neck outward, surge conveyors and high-capacity elevators will permit faster shuttle-car discharge, thus shorter trip time.

Service labor may be reduced. Roof bolts may serve the auxiliary function of providing anchorage for adapters that will support brattice lines, feeders, water lines, or other utilities.

More effective manpower for modern mining also may be secured by providing opportunities for men to upgrade their own quality as mine workers. That means training, which may be organized within the company or purchased or accepted from an outside agency.

As the production capacity of face equipment rises, either through the installation of larger units or modification of methods, the problem of moving the coal away from the face and into the main haulage system becomes more acute. The development of face transportation approaching a condition of continuous flow is becoming more and more important in modern low-cost mining.

If there is one place where overcapacity in equipment may be justified, it is in face haulage. Planning for face transportation should aim at the primary goal of moving away every ton of coal as fast as it is produced, and not merely a goal of lowest-possible cost per ton-mile.

Synchronization is the key to better face transportation, regardless of the type of equipment used. In general, though, high-capacity units are preferred, either mine cars or shuttle cars, to reduce the

time the loader need be stopped for a change. The natural follow-up is to take advantage of the increased capacity by keeping switches or passing points as close as possible to the loading point to limit changing time.

The role of conveyor transportation has been expanded by the development of the bridge unit, which provides a link designed to tie a loading machine to the room conveyor while eliminating excessive maneuvering of the loader. Furthermore, in some instances it may permit a change from hand loading to mechanized loading into conveyors, always a cost-cutting possibility.

New developments hold promise for realization of the continuous-flow principle. Shuttle belts, which can follow a continuous miner through an advance of 50 ft. before a new section of belt must be added, have been tried and found effective.

Modern low-cost mining in essence is a materials-handling job, toward as well as away from the face. "Raw materials," such as ventilating air, roof-support supplies, rock dust, water, and so on, must be channeled in to support coal production. Finally, process wastes, such as excess water, foul air, and debris, must be disposed of.

Each of these individual jobs must be closely studied to determine the most effective ways to get lowest costs with effective performance. Here is where new materials can be of great help.

New materials for the support of face production are made to last longer, thus reducing installation and replacing costs, and are designed for simple, fast installation, thus controlling labor costs. Included in the list are plastic pipe and sheeting, protective coatings, lighter and stronger alloys, long-life insulation, improved lubricants, and so on.

A reasonable investment in power-distribution equipment and labor, designed to keep face voltage up to rating, will be paid off with interest through better machine performance, fewer electrical outages, lower maintenance costs, and greater safety. Adequate substation capacity is the first requirement. The follow-up includes the installation of approved, efficient distribution centers, well-designed plugs and nips at every power connection, and effective circuit-breaker and fuse protection.

Coursing ventilating air through the workings offers other opportunities for savings. Where numerous overcasts are necessary, prefabricated materials may be employed. Preventing leakage through doors and stoppings will result in better face ventilation at lower power costs.

Gravity drainage, of course, cannot be touched for low costs. Seize every opportunity to achieve gravity flow, including flat boreholes through pillars or to the outside or perhaps boreholes to lower old workings that may open to the outside. Plastic and aluminum pipe will cut the cost of installing and moving drainage lines.

Preventive maintenance of the highest caliber is the service contributing most to smooth operation and lowest costs. Scheduled lubrication, inspection at definite intervals and, if possible, planned outages of machines for overhauling will go a long way toward putting maintenance costs on a somewhat predictable basis.

Replacement parts and unit assemblies, stored in section depots, will result in faster clearance of delays, but smooth supply-handling procedures will be necessary if this is to be done with a minimum of waste.—Coal Age, Nov, p70

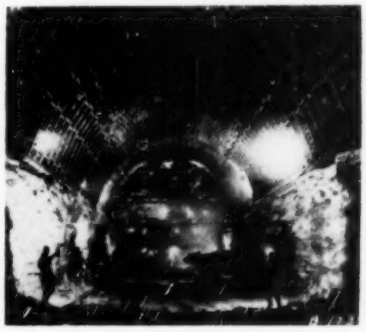
Steel for Aircraft Has Ultra-High Strength

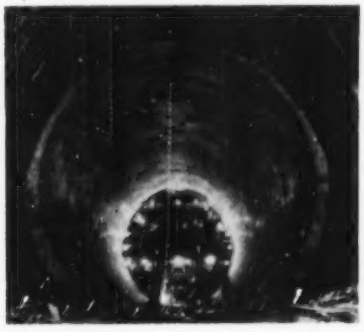
Research by Lockheed Aircraft Corp. has showed that SAE 4340 steel, when heat-treated to a tensile strength of 260,000 to 280,000 lb. per sq. in., is suitable as an aircraft structural material. (SAE 4340 is a nickel-chromium-molybdenum steel.)

Production characteristics of the material present no serious problems. Machinability is excellent although special techniques are needed. Weldability also appears to be satisfactory as far as flash and pressure welding are concerned. Fusion welds can be made with standard electrodes and rods that are commercially available.

Heat treating must be carefully controlled. It should be performed in a controlled atmosphere unless at least 0.020 in. of material is to be removed. Normalizing should precede heat treatment. Tempering temperature should be determined by an as-quench hardness reading or from Jominy hardenability.

All parts should receive a retained-austenite stabilization treatment consisting of a 24-hr. bake at 250° F. after other heating operations above this temperature. Baking should also follow grinding, cold straightening, electroplating, pickling, electrolytic cleaning, or phosphate treatments. —Prod Eng, Oct, p129





Giant Tunnels Feed Power Station

One fifth of the total flow of Niagara Falls, the giant falls between U. S. and Canada, will go through two tubes like these. It's part of construction underway for a new $300-million Canadian power station. The water will flow into the tubes two and one-half miles above the falls, travel under the city of Niagara Falls to just below the Falls.—Power, Oct, p170

an electric sign of dependability in every port

W&T electrically powered Aids to Navigation provide the rugged construction and precise workmanship necessary to ensure unfailing operation of strategic harbor lights. Watertight, constructed of anodized metals, and equipped with time- and laboratory-tested lampchangers and flasher mechanisms, W&T Buoy and Structure Lanterns ensure long life and dependable service.

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F-94

AGENTS IN MOST COUNTRIES
WALLACE & TIERNAN CO., INC.
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Rotary Drill Cuts Cost of Removing Rock Rolls

Left Fork Fuel Co., Inc., saved both time and money in removing severe rock rolls with rotary drills and carbide bits. Rock rolls at Left Fork consist of hard slate rock with laminations and nodules of sandstone. Rolls are 9 to 12 ft. long and pinched to within 1 ft. of the bottom.

To remove them, holes 2 ft. long are drilled at approximately one-third the roll depth from the mine roof. Holes are angled to the roof and spaced across the entry according to the roll's size and hardness. In this manner, the rolls are benched off and the rock removed.

Carbide bits, augers, and pneumatic rotary drills did the job with penetration rates as high as 1 ft. per min. Over a period of 1 yr. no drill maintenance was required.—Coal Age, Nov, p110

Suction Preforms Plastic

A new technique, developed by L. C. Williams and Associates of Houston, Texas, preforms plastic parts reinforced with glass fibers. It utilizes chopped strands of fiber and eliminates hand layup.

A metal screen shaped like the desired part is placed on a turntable over the outlet in a vacuum cabinet. Vacuum sucks glass fiber onto the rotating screen, while a binding agent is sprayed as a mist into the chamber. Air pressure forms the fibers to shape over the screen. The preform is dried, cured, and coated, if weatherproofing is desired, with a polyester resin.

The kind of binding agent depends on part design and required properties. For parts that need a low strength, an ethyl cellulose solution is satisfactory. If parts must be strong, polyester resins or thermosetting alkyd molding compounds are better; they are well adapted to the technique as they require low temperatures and pressures for curing.

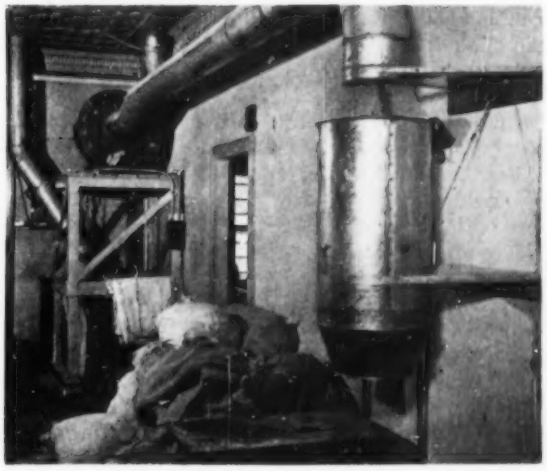
The biggest preformer built so far has a 46-in. turntable opening. A larger unit could make plastic automobile bodies.—Prod Eng, Nov, p198

Ceramic-Industry Ideas

Enameled-Ware Drying . . .

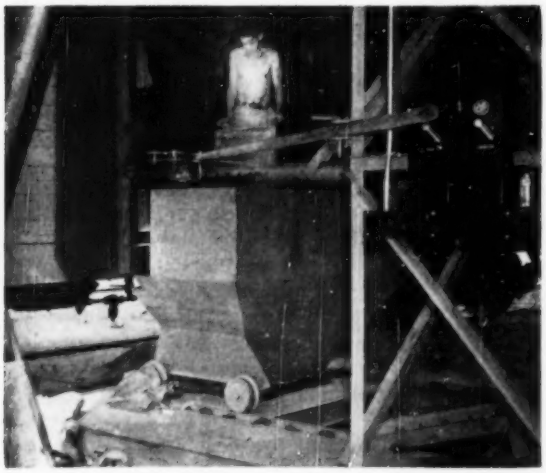
. . . can be speeded up by moving material on a wire mesh belt, such as these sinks being dried after spray pickling. Wire can be made of different materials to resist heat, acids, alkalis, and abrasion. The mesh permits liquids to drain through, thereby aiding the drying operation. The belt is easily cleaned of enamel deposits. A wire-mesh belt provides the best means of conveying pieces through the dryer where different size pieces or where pieces cannot be hung are the rule.

Waste-Material Salvage . . .



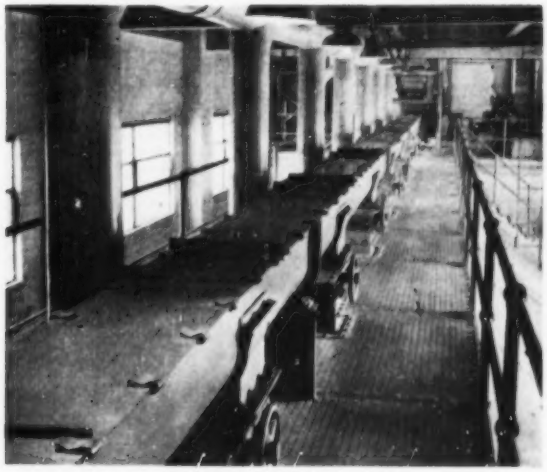
. . . can save much of the 1 to 2% of raw materials that an enamel batching department normally throws away each day in bags that have been inadequately emptied by the usual means. Thorough cleaning of the bags before they are discarded can avoid most of this drastic loss. The machine shown is particularly effective in cleaning burlap sacks. Management was unaware of the loss but when it discovered the wastage it took immediate steps to install the machine.

Unloading Raw Materials . . .



. . . is a faster, cleaner job with properly arranged unloading systems. This glass plant has a powered scoop that gathers bulk material from the railroad car, drags it out, and empties it into a portable chute. A belt beneath the chute conveys material from railroad tracks to bins and elevators. The chute is rolled back from the tracks when not in use. Because operation is entirely enclosed, there is no possibility of contamination being blown into the material from the tracks.

Spiral Conveyor Solves . . .



. . . the problem of long-distance hauling of glass-batching material when it must be made available at different positions. The conveyor, 100 ft. long, delivers material at 10-ft. intervals. At each point, there is a drop with an opening valve feeding a separate weighing apparatus and collecting belt conveyor. When conveyor must feed more than one gathering belt at a time the appropriate valves are opened and the conveyor feeds each selected station.—Ceramic Ind, Nov, p79 & 81

Cast Refractories Lower Furnace Costs

All-cast heat-treating furnaces, according to Lansing Drop Forge Co.'s experience, offer the advantages of better balanced operation, low heat loss, high output. And the elimination of brick construction reduces over-all costs and construction time.

Lansing Drop Forge first built a 1,000° F. stress-relief furnace 23 ft. long, in just 3 weeks, with only a four-man crew. After forms were built, lower sidewalls of 9-in. thickness were poured with Litecast 50, made by General Refractories Co. A 50-lb. bag mixed with water in a concrete mixer makes 1 cu. ft. of furnace lining.

The furnace was poured in three sections with 12 to 24 hr. between each pouring. The first section included the bottom and sidewalls up to 27-in. height. Conveyor supporting rails were then set on the sidewalls, and the rest of the sidewalls was poured around them.

The second section poured brought construction to total furnace height. The third completed the furnace, including the combustion chamber.

The company is now operating this furnace as well as a 1250° F. annealing furnace built later. Both, operating on 1,000-Btu. gas, are heat-treating 81-mm. shells.—Iron Age, Oct 22, p113

Keeps Progress Record

At the beginning of the year, Sycamore Spinning Plant, Ala., lists on a bulletin board in the superintendent's office all the jobs that have to be done during the year. The purpose of the board is to let the supervisors grade themselves on their progress.

At the end of each month, they mark up what jobs they started working on and what jobs they finished; so at the end of the year, the scheduled jobs should be marked off. Different colors list the jobs for the different operating departments.

Another color scheme indicates what is being done about each job. Red means nothing being done, white means the job is being worked on, and blue means the job has been finished. As the year progresses, the colors on the board gradually change from red to white to blue.—Textile World, Nov, p176

"Pile-Driver" Bucket Digs Hard Materials

A pile-driving principle of operation is incorporated in a bell-hole digger, grapple, and materials-rehandling bucket being manufactured by Quick-Way Truck Shovel Co., Denver, Colo. The bucket is suspended from a specially designed frame that incorporates a hammer drive. The hammer mechanically lifts and drops with pile-driver action on the frame mounted over the bucket. This action drives the bucket into the material being excavated with the jaws of the bucket open.

With the jaws in this position, the bucket gets a straight down bite and then powerful clam jaws move in on the radius from both sides, which further helps break up the material.

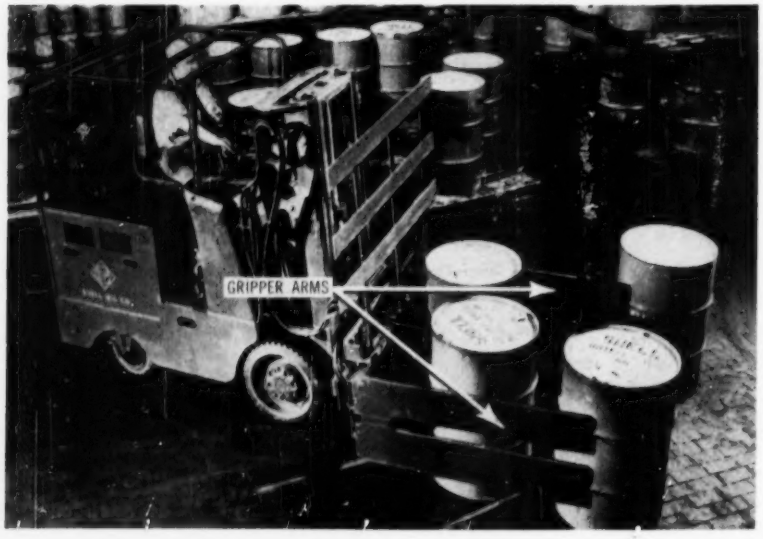
There are no sheaves nor counterweights down inside the bucket, and interchangeable hammer weights can be added or taken off to suit individual requirements.—Const Meth & Equip, Nov, p65

Higher Octanes Coming

Gasoline octane and compression ratios will rise during the next few years and motorists will benefit with improved car economy. The over-all effect, according to E. V. Murphree, president of Standard Oil Development Co., in a speech to a Society of Automotive Engineers meeting, will be a 15% increase in automobile performance by 1961.

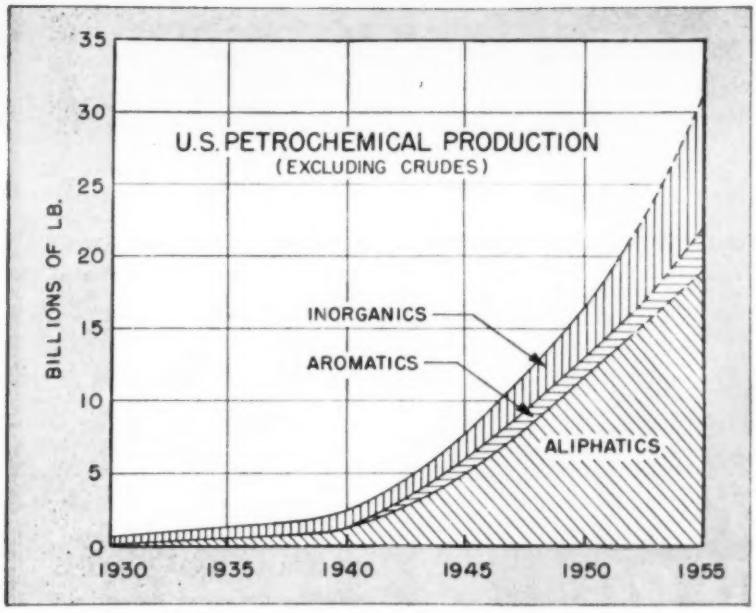
Murphree based his prediction on improvements in engine design and in gasoline quality by addition of catalytic reforming to catalytic cracking in refinery operations. His estimate for 1961 indicates 93.7 research octane for regular grade gasoline and 99.7 for premium quality.

Results of this study, while regarded by the oil industry as an important contribution, have not been accepted by all. Some research men feel that, because of the emergent problem of preignition, they should avoid over-simplification of the concept of octane and compression-ratio relationship.—Oil & Gas J, Nov 2, p66



New Gripper Arms for Fork Trucks

Shell Oil Co. developed this lift-truck attachment to eliminate pallets, thus cutting up to $750,000 a year off its distribution costs. Same gripper arms handle different types of loads—drums and packages, for instance. Thinness of arms permits close stacking to save space. Friction provides main lifting force. Largest attachment handles 2 tons.—Factory, Oct, p110



A Growth Industry

Petrochemicals Postwar

This fast-moving industry is carving itself a good piece of the U. S. chemical industry. Here's what you can look for in the next 2 years in rise of petrochemicals

A SHARP UPSWING in petrochemical production began in 1940, then accelerated at the end of the war to make it one of the outstanding growth industries in the U. S.

By 1955, total petrochemical production is expected by R. L. Bateman and J. A. Field of Union Carbide & Chemical Corp. to reach a yearly volume of 31.5-billion lb. —worth $4-billion. They made this prediction, based on intermediate products, at the recent annual meeting of the American Chemical Society.

This production will represent 19.4-billion lb. of aliphatics, 3-billion lb. of aromatics, and 9.1-billion lb. of inorganics. These figures indicate that in 1955 the petrochemical industry will occupy even a larger part of the chemical industry than it now does and have $4-billion invested in facilities.

What is responsible for this rapid growth? Since 1945, 46 new petrochemicals have grown to tank-car stature by finding markets in six major fields—agriculture, plastics, synthetic fibers, specialty rubbers, drugs, and detergents. Let's take a look at some of them and their uses.

Hydroxy compounds include butyl ethyl propanediol, an insect repellent; diisobutyl carbinol, a reaction medium; iso-octyl alcohol, a plasticizer for vinyl resins; methoxy polyethylene glycols, in textile processing; propylene glycol alkyl ethers, in lacquer solvents and agricultural emulsifiers; nonyl phenol, in detergents.

Aldehydes and ketones: acrolein, a starting material for methionine; diisobutyl ketone, a high-boiling lacquer solvent.

Halogenated compounds: chlor IPC, a weed killer; chlordane, aldrin, and dieldrin—insecticides; sodium dichlorphenoxyethyl sulfate, a pre-emergence weed killer.

Esters and ethers: allethrin, an insecticide as a substitute for pyrethrum; diallyl phthalate, low-pressure laminating resins; maleic alkyl esters, monomers for vinyl resins; octyladipate, octylphosphate, and octyl hexahydrophthalate as plasticizers; vinyl alkyl ethers, polymers in pressure-sensitive adhesives; and dimethyl carbate, insect repellent for skin application.

The amines include dimethyl formamide, a nylon spinning solvent; gamma-Picoline, the starting point for the tuberculosis drug, isonicotinic hydrazide; and methyl vinyl pyridene, which is used to enhance dyeing properties in acrylonitrile fibers.—Pet Proc, Oct, p1537

Four-Track Movie Film Made for Stereo Sound

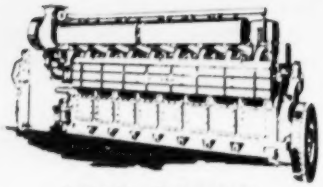
By narrowing the size of the picture frame and cutting the width of the sprocket holes along the edge of the film, four sound tracks for a stereophonic system can be placed on the same strip of film as the picture.

The new system permits the showing of films using stereophonic sound with a minimum adaptation of projection room equipment.

Changes required in the projector are the installation of a magnetic-tape pickup unit and an alteration in the size and spacing of the film sprocket wheels. The alterations do not affect the running of regular films in the projector.

The new film was introduced by 20th Century Fox for use with their Cinemascope wide-screen pictures. Three sound tracks 0.063 in. wide provide a separate channel for sound to speaker systems placed to the right, center, and left of the theater. A fourth track, narrower than the others, is used for recording background and special effect sounds, such as thunder or crowd noises.

The film is run through the projector at standard speed, giving a tape speed of 18 in. per sec.—Electronics, Oct, p202



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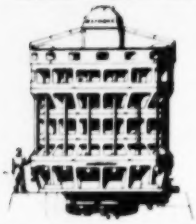
2 and 4-cycle types, for fuel oil, Duafuel and natural gas operation —from 10 to over 10,000 H.P.



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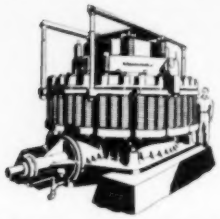
for heavy duty crushing of ores and industrial minerals.



SYMONS CONE CRUSHERS

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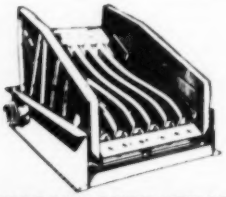
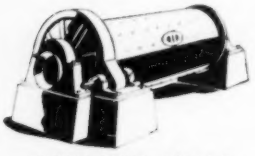


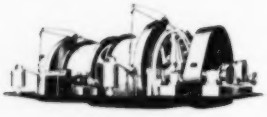
SYMONS VIBRATING GRIZZLIES AND SCREENS

for all types of wet and dry screening, from scalping on through the finer separations.



GRINDING MILLS

and other Machinery for basic processing of ores and minerals.



MINE HOISTS

in types for hauling both ore and men, in large coal and metal mining operations.

RAILWAY MAINTENANCE MACHINERY

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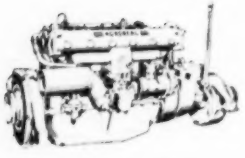

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TECHNICAL SHORTS

Gas and Salt—Underground storage of jet airplane fuel in salt dome formation near Wichita, Kan., proved so successful the U. S. Air Force has decided to try high-octane aviation gasoline next to see what effect the salt will have on tetraethyl lead.—Nat Pet News, Oct 14, p31

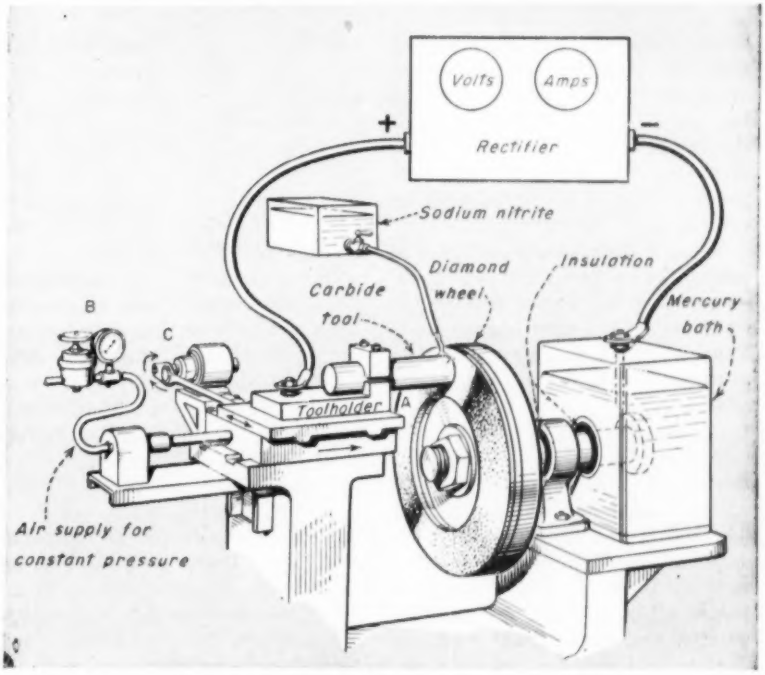
VPI Protects Shafts—Finish-machined shafts at American Blower Corp. are no longer sprayed to avoid rusting. Instead, they are wrapped in VPI protective papers—Angier Brownskin and Barrier Wrap Crepe, both made by Whitfield Chemical Co. The wrapping will protect shafts in storage over long periods.—Iron Age, Oct 15, p111

Sulfite Pulping—Nekoosa-Edwards Paper Co. of Port Edwards, Wis., is testing a sulfite pulping process that uses soda instead of limestone as the cooking-chemical base. The process is claimed to reduce stream pollution as the spent liquor is not discarded but processed and burned.—Chem Eng, Nov, p112

India and Electronics—Work will begin shortly on the construction of a $1-million Control Electronics Engineering Research Institute in Pilani, Central India. It will undertake research and development work in all aspects of electronics. —Electronics, Nov, p26

Too Many Misses—Petroleum geology has come a long way, but it has a lot farther to go according to current oil discovery statistics. Nine wells are drilled for each discovery. So geologists come up with wrong answers 89% of the time —Oil & Gas J, Nov 2, p60

Electronic Nose—The Tritilog, developed by the Consolidated Engineering Corp., Pasadena, Calif., can detect and measure sulfur compounds in gases to a sensitivity of one part in 10-million.—Elec West, Oct, p94



Electrolytic Grinding of Carbides

Tests at Carborundum Co. showed electrolytic grinding of carbides with metal-bonded diamond wheels to be as much as six times faster than conventional grinding with resinoid-bonded diamond wheels. Infeed motion of tool holder toward wheel A on a Hammond grinder was controlled by pressure regulator B, and transverse motion by variable-speed drive C. Tests were made on single-point tools. Other test results: wheel wear less than 1% as much as in conventional diamond-wheel grinding, tool surface finish as good, less spindle power needed. Electrolyte found most satisfactory was a 5% solution of sodium nitrite applied at the point where carbide tool contacts the wheel.—Am Mach, Sept 28, p122

Midget Capacitor—A tantalum capacitor, about the size of a match head, has been announced by General Electric Co. It is designed for transistor circuits and is available in rating of 0.7 to 4 microfarads with voltage ratings of 2 to 16 v.—Aviation Wk, Oct 26, p80

Nuclear Power — Westinghouse Electric Corp. has been authorized by the U. S. Atomic Energy Commission to build a full-sized atomic power plant. To be finished in 3 to 4 years, it will have a minimum capacity of 60,000 kw.—Chem Wk, Nov 7, p45

Gage Wear Tolerances—At a British National Physics Laboratory symposium on measuring methods, Dr. Helding Tornebohm of SKF, Sweden, asserted that wear allowances on chromium-plated and carbide gages are unnecessary. With no wear allowance, work tolerance can be made greater and product cost is lower.—Mach, Oct 31, p1842

Refinery-waste Disposal—Reliance Chemicals Corp. is working on a method to treat refinery waste with bacteria—similar to sewage bacteriology. The problem is to find right combination of microorganisms.—Pet Proc, Oct, p1443

Talent in Your Plant

Survey suggests that at every level there is a small number of employees worth training for the next higher level. Promoting from within ends some problems

EVERY TIME you bring a promotable man up from the ranks, another promotable man steps up to take his place. That's the finding of Eugene J. Benge, Hu-Management Engineer, Asheville, N. C., after years of "talent search" consulting experience.

Benge's surveys suggest that at each level a certain number of employees are worthy of training to fit them for the next higher level. True, at any given time, the percentage is not large (3% seems average).

But the supply seems inexhaustible. Promote 3% of your skilled men to key positions—and in a few months there seems to be another 3% waiting. The stimulation resulting from the first batch of promotions apparently crystallizes potential in a second group. And what is important, their attitudes change.

Every executive probably knows of several employees who are promotable in all respects, except attitude. Benge's surveys reveal clearly that an important segment of employees resents bringing outsiders in to fill vacancies. They believe their own abilities go unrecognized. Employ from the outside and you are sure of spoiling employee morale. Promote from within and you build employee morale, make more employees promotable.

In your plant, look over a group of 100 rank-and-file employees at their benches or machines. Benge's findings indicate that at least three of them have abilities worth managerial attention. In fact, these three will likely quit your company within the next 2 years, to accept better positions elsewhere. Or they will become malcontents, on silent strike against you at all times.

As malcontents, they cannot come to you and say: "I'm smarter than you think. I have superior abilities you are not using. You are forcing me to do tasks that run counter to my interests. If you don't stop it, I'll raise hell!"

How do you dig this hidden talent out of the ranks? The search for talent with a continuing follow-up program is the answer—not just for the one time, but for the forseeable future as well.

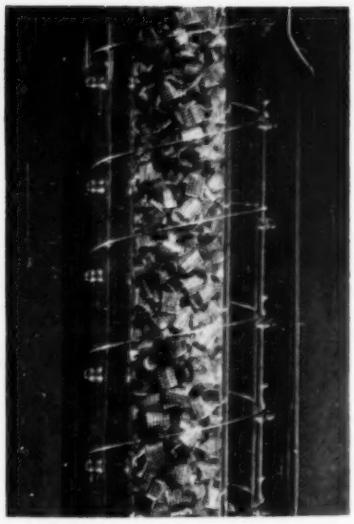
Survey results in ten companies are illuminating. These are results from aptitude testing only and do not include the long-time continuing program. Of 100 employees, 10 volunteer, 3 are qualified, 7 are unqualified. But 90 fail to volunteer. Assume 9 in this group are qualified.

These figures would yield 12 qualified persons out of each 100 employed. Three can readily be located by aptitude testing. Nine must be uncovered by other means.

What are they qualified for? Averages cannot answer this question, but Benge's basic figures reveal:

1. Many of them possess a large variety of mechanical information.
2. Rather few reveal both speed and accuracy in clerical operations.
3. An appreciable number of these employees are extrovert, dominant, and well adjusted—traits that are useful in supervision.
4. Outstanding interests (in descending order) are mechanical, social service, computational, physical science, biological science, and clerical.

From these findings it would seem that a given company has in its own ranks an important supply of employees worthy of training as mechanics, supervisors, personnel workers, industrial engineers, and scientific assistants. This is a heartening picture, especially if your country has an industrial future built on a developing technology that may lead toward increased automation.—Factory, Nov, p104



New Column Packing

This packing material for distillation columns consists of small nickel or stainless-steel plates drilled and curved into semicylinders. Burrs on the back of plates create a high capillary effect. Advantages: high flood rate, excellent efficiency, and high percentage of free space. The "protruded packing" was developed by Dr. M. R. Cannon of Pennsylvania State College and is sold by Scientific Development Co.—Oil & Gas J, Nov 9, p68

High-Speed Facsimile

High-speed, low-cost facsimile equipment, developed by U.S. Navy for its own use, transmits documents instantaneously over long or short distances. Previous equipment operating at high speeds required photographing the copy to be transmitted, and it delivered the copy on photographic film. The new unit sends copy as is and delivers copy that can be directly reproduced on standard office offset-type equipment.

The facsimile signal can be transmitted over concentric cable or by radio relay. Horizontal scanning is electronic in both sending and receiving units. Rate is 240 lines per sec. Vertical scanning is provided by continuous motion of subject and copy. A continuous Xerographic printer processes copy at the receiver.

The machine now serves only military purposes. Eventually its commercial applications may outstrip its military importance.—Prod Eng, Nov, p203

New Baking Enamels

▶ **Water-emulsified,** nonflammable industrial enamel for metals has been announced by Sherwin-Williams Co. The water is added as a thinner at the point of use. The enamel has good hardness and adhesion, machines readily, and will not vapor-wash.—p334

▶ **Hydrophen,** a water-soluble enamel, is offered by Reichhold Chemicals, Inc. It also is intended for coating metal; its biggest market is seen as the automotive field.—p334

▶ **Hi-Heat enamel,** made by Sherwin-Williams Co., is a silicone-alkyd resin product that is claimed to be non-yellowing under sustained temperatures of over 500° F. Potential uses include heaters, deep fry units, roasters, and industrial parts.—p341

▶ **Nubleon-S** is a silicone baking enamel that forms a flexible coating hard enough to use on home appliances and prefabricated buildings. Yet it is flexible enough to be applied before the metal is formed. Made by the Glidden Co., the enamel requires curing at 425° F.—Chem Eng, Nov, p342

Fixture Speeds Welding

Production of tubular side frames for invalid chairs has been increased by Erie City Mfg. Co. from nine frames per hour to 25. The 178% increase was made by replacing oxyacetylene torch brazing with silver brazing in a two-fixture carriage.

The machine has a heating station at each end. The carriage is pushed back and forth along a track to bring fixtures under heating stations. As one fixture is under the burners, the other is free for unloading and loading.

Tubular pieces are assembled in the fixture and clamped with toggle clamps. The five joints to be brazed are fluxed, silver-alloy inserts are placed, and the fixture is rolled into the heating position.

The burners, using a mixture of city gas and air, face each joint from four directions to assure uniform heating. At the end of 85 sec., the gas is turned off automatically. Pilot lights relight the burners at the proper point in the next cycle.—Weld Eng, Nov, p30

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Typical of the machine tools that have made the Ex-Cell-O name famous are its machines for precision boring, turning and facing. The Ex-Cell-O Style 1212-A Machine shown handles small and medium size parts and can be tooled for small or large volume work. One or more precision spindles can be arranged on each machine bridge. Controls of the hydraulically operated machine table are easily adjusted for an automatic cycle which may include rapid movement, two infinitely adjustable feed rates in both directions of travel, immediate or dwell reverse and stop.

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Dirty wooden engine house . . .

Gets fire protection with . . .

Fire-Retardant Coating

Converting an old wooden structure is more than a job of cleaning and painting. It must be protected against sudden disastrous fires. A fire retardant can do it

AFTER CONVERSION of an old engine house owned by the Burlington Railroad, the line officials were faced with the disquieting fact that the old wooden building was prone to fire. Ceilings, columns, and walls had deposits of inflammable grime that had been collecting for years. And should a fire break out, it would almost certainly mean loss of most of the 12 diesels stored there.

The road's maintenance officer examined the building and suggested that the best practical solution would be to treat the wood with fire-retardant chemicals. A contract for the work was given to W. P. Slattery Co., Chicago, Ill., midwest coating applicator for Albi Manufacturing Co., Rockville, Conn. Albi's fire retardant is applied like ordinary paint and comes in colors. Burlington chose a light grey.

Beginning with the five-stall section, the contractor worked on one or two stalls at a time, first removing the ¼-in. thick coating of soot and oil by ejecting low-pressure steam through a pipe having a flared nozzle with a slotted orifice. A caustic solution was fed into the stream in predetermined amounts to assist in the cleaning. This method successfully removed the old coating, exposing the clean wood surface.

The cleaned surface was allowed to dry for at least 24 hr. before the first coat of protective material, Albi PC, was applied, 1 gal. to 200 sq. ft. This first coat substance is an emulsion that can be brushed, sprayed, or applied with a roller. At least 24 hr. was allowed for the drying of the first coat. When it dried, a second coat of Albi 99 was put on at the same rate as the first. This material is an oil-type fire retardant. Both coats were applied with spray guns for quick, simple covering.

The contract covered the cleaning and application of the fire-retardant coating to the underside of the roof and all supporting timbers, such as purlins, girders, timber columns, and knee braces. Cost was less than 18 cents a sq. ft.

In case of fire, the retardant should keep it from spreading long enough for fire equipment to arrive. And by then, the diesel engines should be safely outside the building.—Railway Age, Nov 2, p58

Are You Overlooking Platform Trucks?

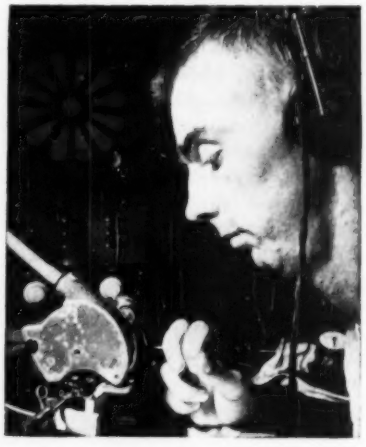
Powered platform trucks are probably the most overlooked of plant "rolling stock." Sometimes fork trucks rather than platform trucks are used for long moves. Fork trucks were not designed for that purpose—expecially where no stacking is involved.

It is normally uneconomical to use fork trucks for moves exceeding 350 or 400 ft., whether or not stacking is involved. On moves of 850 ft. and longer, tractor-trailer trains are generally more economical.

Where platform trucks are especially suited to the move, here are two advantages they can have over fork trucks of similar capacity:

1. Bigger load to gross-weight ratio. Fork trucks have a heavy counterweight at the rear. Platform trucks do not.

2. Lower cost. Platform trucks weigh less and are basically simpler in their design.—Factory Nov, p142



"Hears" Metal Removal

Unusual industrial stethoscope, developed by Minneapolis-Honeywell Regulator Co. for its own use, speeds up burnishing operations, reduces scrap and operator fatigue. Sound volume during burnishing is in direct proportion to the amount of metal being removed. Amplifying the sound from the burnishing wheel guides the operator in holding close tolerances. An electronic comparator used with the stethoscope checks dimensions to 0.000005 in.—Iron Age, Oct 1, p116

New Oil Additive Inhibits Engine Rust

A new, rust-inhibiting oil additive —particularly indicated for use in internal combustion, jet, diesel and gasoline engines, turbines, pipelines, and ferrous tools or components in the production stage—has recently been put on the market in commercial qualities by the Atlas Powder Co., Wilmington 99, Delaware.

The firm says that the inhibitor, Atpet 100, "provides freedom from pre-ignition and other undesirable effects of ashy residue encountered with sulfonic inhibitors containing the salts of such metals as sodium, calcium or barium." Atpet 100 is a sorbitan mono fatty acid ester similar to Atlas' Span 80, used in many military applications. The maker points out, however, that the new inhibitor's "performance and economy . . . show substantial improvement over Span 80 under many conditions."

Shipped as a concentrate for the refiner or compounder to add to his oil, the inhibitor has been put through extensive laboratory tests. These tests show that Atpet 100 provides improved protection, even in reduced concentrations, and that it gives consistently uniform action.

In a standard humidity cabinet test, Atpet has withstood 634-hr. exposure at 1% concentration in oil, or nearly double that obtainable with earlier inhibitors. The new product also behaves well in highly refined oils, which tend to resist the action of inhibitors.—Aviation Wk, Nov 16, p90

About Food Coatings

Food processors are toying with the idea of adopting the electrostatic-deposition technique for coating many foods. Coating emitted from spray nozzles or similar units, for example, may be positively charged and directed onto products traveling on a conveyor at a negative potential.

Possible uses are for enrobing candy and cookies with chocolate or compound coatings, waxing fruits, vegetables, nuts, fish and poultry, and applying frostings and flat icings to bakery products.

Sooner or later, some food processor will probably apply coatings by a double-extrusion operation. The center of the product will be extruded through a die in the center of a larger annular die. And the coating will flow from the encircling die to form a snug cover on the faster moving center.—Food Eng, Oct, p182

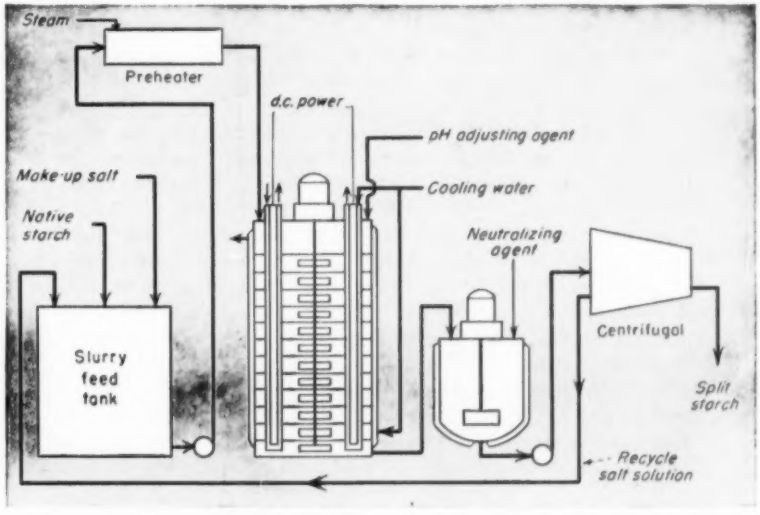
European Show Unveils Machine-Tool Trends

Almost 3,000 machine tools were shown by 770 firms from 14 nations at the Third European Machine Tool Exhibition held in Brussels in September. Germany dominated the show with the products of 318 firms. France with 121 was second, followed by Switzerland, Belgium, Italy, Great Britain, U. S., Sweden, Netherlands, Austria, Spain, Lichtenstein, Denmark, and the Saar.

Unusual machines on display included two British units for spark machining, a German gear hobber with pneumatic programming, a Swiss internal-spline grinder with wheel driven by coolant impinging on a turbine wheel, and a German two-crankshaft deep-drawing press.

Trends noted at the exhibition indicated that:

- **Most lathe makers** are featuring copying attachments and special copying lathes.
- **Automatic sizing** is gaining. Devices are pneumatic, electric, and electronic.
- **Spindle speeds** seem to be leveling off now that the normal maximum for carbide cutting has been reached on many machines.
- **Electric controls** are rapidly replacing levers and handwheels.
- **More measurements** of grinding work are being made at the machine. One transfer machine is equipped with an automatic inspection device.
- **Electric,** pneumatic and optical equipment are gaining ground.—Am Mach, Sept 28, p164



Electrolytic Oxidation Splits Starch

New German process, developed by Aktiengesellschaft A. Hering of Nurnburg, splits starch continuously in the production of oxidized or "chlorinated" starches. Oxidized starches, usually made by a slower batch process, are employed as tub sizes and coating adhesives in the paper industry and as warp sizes and finishes for textiles. Splitting is done in a diaphragm-less electrolytic cell in which sodium hypochlorite is generated. A water slurry of starch is preheated, then fed to the cell. The salt electrolyzes, producing chlorine and sodium hydroxide, which with no diaphragm present immediately react to form sodium hypochlorite. The hypochlorite decomposes to form sodium chloride and nascent oxygen, which reacts with and splits the starch molecule. Starch solution is neutralized and centrifuged to separate the starch.—Chem Eng, Oct, p118

Better Oil Recovery

Water-soluble detergent additives may increase water-flood oil recoveries by as much as 26%, according, to tests made by U. S. Bureau of Mines. The tests show that 0.1 wt.-per cent solutions of 16 polyoxyethylated non-ionic detergents displace 1.15 to 1.33 times as much oil from synthetic oil-sand samples as water.

Of all additives tested, water-soluble detergents were most consistently effective in increasing oil recovery. They lower the tension in the oil-water interface and promote the wetting of solid surfaces by an aqueous phase.—Oil & Gas J, Nov 9, p67

Letter from the Editor

Dear Reader

Have you ever stopped to think what part the business publications you read play in your business life—and in the life of your business? Their main function, of course, is educative—to make available to you, quickly and without bias, the experience of others in your own and related fields.

This editorial purpose of service was well expressed by Ing. Samuel Dultzin, vice president of the Mexican Machinery Importers Association, in an unexpected tribute to McGraw-Hill during the association's recent convention in Monterrey.

"One of the important elements in technical and scientific progress," he said, "is the diffusion of ideas, knowledge, and experience. In the course of this work of diffusion, McGraw-Hill has become one of the pillars of this century's great technological development.

"Within our field of activity, that of distribution of machinery, McGraw-Hill is our ally. In Mexico we already have gone beyond the stage of selling machinery indiscriminately, and distributors of machinery now have at their disposal trained personnel, with technical knowledge for the selection, application, and adequate use of each machine.

"The engineers who work in our companies received a large part of their technical education from the great McGraw-Hill textbooks. And in following out their professional careers, they have the means of keeping up to date with technical developments, new equipment, and new production methods, thanks to the great series of specialized McGraw-Hill publications.

"Within our companies we keep stocks of machines, accessories, and parts, which are supplied by our factories. We also keep a stock of ideas, which we put at the disposal of our clients in industry, in the field, and in public works. One of our important sources for the supply of new ideas in everything pertaining to our activities is McGraw-Hill . . . and we would like to express (to their representatives) our sincere gratitude. . . ."

And we wish, Senor Dultzin, to express our appreciation for your kind courtesy.

Sincerely yours,

Harry S. Wharen

Harry S. Wharen

Facsimile Networks Find Many New Uses

Several novel uses for facsimile networks have been reported in the news lately. The Federal Reserve Bank of New York is now transferring $1-billion daily between member banks over its own private facsimile system. A bank in White Plains, N. Y., recently caught a check forger in the act by using "facsimile" to compare check signatures with the depositor's record card.

A traffic judge in Baltimore uses the system to check an offender's violation record on file with the state motor vehicle bureau before pronouncing sentence, and American Express has a facsimile network to circulate numbers of stolen traveler's checks. In all, 10,000 units are installed in 50 different cities. Another 7,500 units will be installed during 1954.

Currently being developed by Western Union Co. is a 300-word-per-min. letter facsimile unit and a special coupon transmitter for error-free transmission of way bills, wheel reports, and other vital railroad operating data.—Electronics, Nov, p18

Rugs That Stay Cleaner

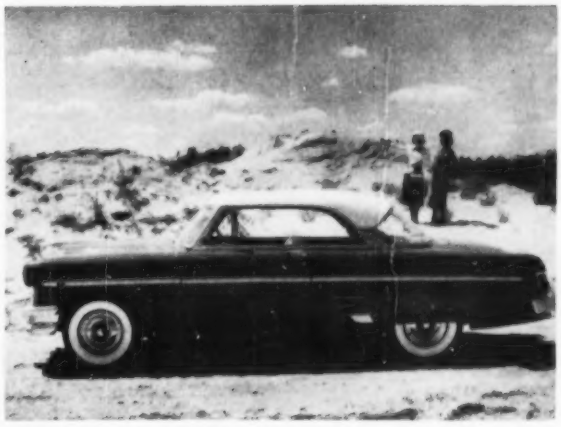
No secret any longer is the chemical treatment that Mohawk Carpet Mills, Inc., developed to keep rugs and carpets cleaner. It was developed particularly for fabrics made of cotton and synthetic textiles. Other firms also have been working on their own techniques.

The Mohawk process applies colloidal silica to the fibers before looming or to the finished rug by dipping, spraying, brushing, or rolling. The colloidal solution is diluted to 5%-solids silica. The silica is dried onto the fibers so that about 0.25 oz. per sq. yd. remains.

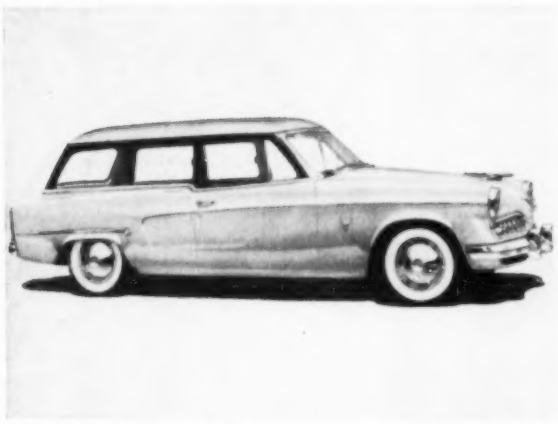
The treatment is applied in the mill. But Mohawk is investigating the application of silica to rugs in use as it might be removed in two or three shampooings. One idea is to incorporate the silica in the foaming detergent shampoos that professional cleaners use.—Chem Wk, Oct 31, p48

For 1954: More Horsepower

CHRYSLER WINDSOR DELUXE line is powered by Spitfire 119 engine. Anti-roll front suspension gives driver fuller control of car at all speeds.



MERCURY MONTEREY hardtop has four-barrel carburetor, 161-hp. engine, several style changes, and new ball-joint suspension. Interior also has been restyled.



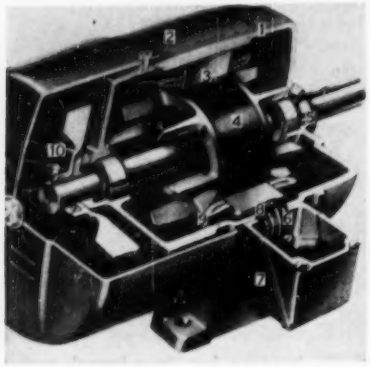
STUDEBAKER is entering the station wagon field this year with this model called the Conestoga. Wagon holds six people. Second seat folds into floor for more space.

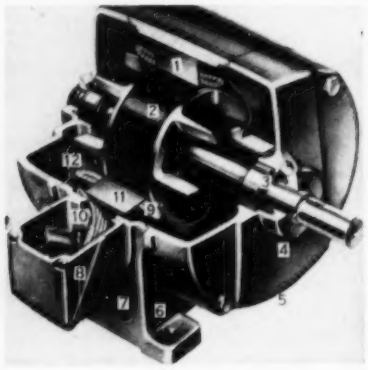
DODGE is adding this four-door station wagon to its line in 1954. It can accommodate six or eight passengers, has either a 6- or 8-cylinder engine to choose from.

HUDSON HORNET has major body and interior changes. All Hudson models now have step-down design. Engine develops 170 hp. with Twin H-Power multiple-fueling.

NASH RAMBLER for 1954 is company's first venture into four-door model. Design is by Pinin Farina. Compression ratio is 7.3 to 1.—Am Auto, Nov & Dec

NEW PRODUCTS





New Polyphase A-C Motors Offer Smaller Size, Higher Efficiency

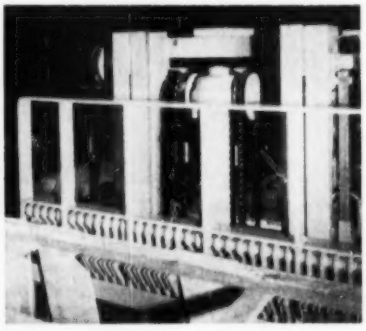
Size reduction by volume of 50% per horsepower is claimed for Tri-Clad "55" polyphase a-c. motors. They incorporate new insulation, bearing assembly and ventilation plan.

Insulation is a polyester film eight times as strong as previously used materials. Bearing assembly is tightly sealed and is lubricated by a long-lasting grease. Ventilation system cools the motor by drawing in air from both ends.

Construction features of the motors are shown by the cut-away views. For the totally enclosed fan-cooled motor, they include: (1) moisture-proof sealing compound, (2) cast-iron enclosure, (3) polyester-film slot and phase insulation, (4) solid cast rotor windings, (5) labyrinth seal, (6) permanently numbered leads, (7) accessible conduit box, (8) compression-tight seal, (9) water-shedding stator windings, (10) split-hub fan.

Features of the drip-proof model include: (1) polyester-film insulation, (2) solid cast rotor windings, (3) sealed bearing system, (4) fully protected end shields, (5) double-end ventilation, (6) cast-iron enclosure, (7) louvered ventilation exhaust, (8) conduit box, (9) securely anchored stator windings, (10) permanently numbered leads, (11) press-fitted stator punchings, (12) ventilation baffle.

Motors, rated at 1,800 rpm., are available in sizes of 1, 1½, and 2 hp.—**International General Electric Co., 570 Lexington Ave., New York 22, N. Y.**—Am Mach, Oct 26, p172



Automatic Crate Lifter

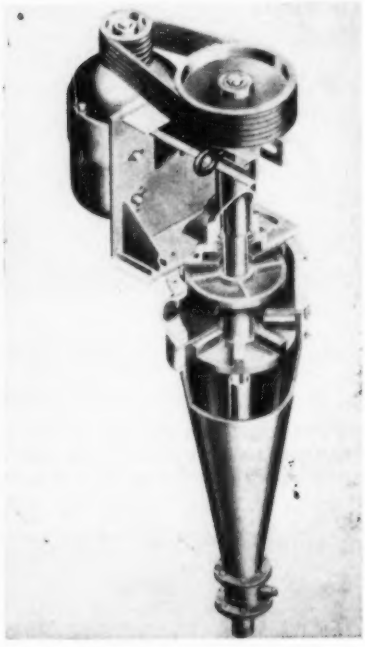
Fully automatic crate-lifting attachment handles most types of open crates without aid of pallets, skids, or forks. It consists of a row of sawtooth-edged fingers mounted on a frame that can be attached to the fork carriage of the truck.

The crate is lifted by these fingers bearing against the underside of the crates' top crossbar. Sawtooth design prevents slipping. Maximum lifting height of truck is not affected by this attachment.—**Yale & Towne Mfg. Co., Philadelphia 15, Pa.**—Factory, Nov, p184

Copolymer for Coatings

New "internally plasticized" vinyl-acetate copolymer eliminates problems in compounding polyvinyl acetate with chemical plasticizers.

Called Darex Everflex, the copolymer replaces polyvinyl acetate in regular formulations for adhesives and coatings. Internally-plasticized copolymer does not lose flexibility through ageing, migration, or the volatility of conventional plasticizers.—**Organic Chemicals Div., Dewey & Almy Chemical Co., Cambridge, Mass.**—Textile World, Oct, p160



Integral-Pump Cyclone Gives High Fluid Speeds

Higher circular fluid velocities and greater centrifugal forces are advantages of the Centriclone, a liquid cyclone classifier available in 10-, 20- and 30-in. dia. An internal impeller gives the required velocities up to 120 ft. per sec., compared with 40 to 50 ft. per sec. for conventional cyclones.

Biggest use for the Centriclone is in tough microsizing, desliming,

desanding, dewatering, classifying and thickening jobs. Particular application will be in closed grinding circuits for sizing in the 10- to 40-micron range, as required in catalyst manufacture, separation of seed crystals, and removing oversize from fine solutions. An installation in a cement-mill closed milling circuit is operating on a feed containing 65% solids.—**Oliver United Filters, Inc., 33 West 42nd St., New York 17, New York**—Chem Eng, Nov, p212

Low-Cost Hoist

New twin-cylinder Model 2426 hoist is specially designed for platform bodies 8 to 17 ft. long and dump bodies 8 to 10 ft. long. It is a low-cost lightweight but sturdy all-hydraulic hoist.

Operating features include a 50° dumping angle for swift and positive dumping; a low first cost because of simplified construction; greater payload because of lighter weight.—**Heil Co., 3000 W. Montana St., Milwaukee 1, Wis.**—Coal Age, Nov, p122

Heavy-Duty Air Hose

New heavy-duty air hose is suitable for working pressures up to 40 lb. per sq. in. Called Commander, the hose is reinforced with a single braid of high-tensile steel wire.

Availables sizes are ½, ¾ and 1 in. Hose is designed for rugged service in mines, quarries, construction projects, and for general industrial use where hose cover is subjected to severe abrasion.—**B. F. Goodrich Co., Akron 18, Ohio**—Eng & Min J, Oct, p110A

Mechanized Sweeping

This power sweeper reportedly sweeps over 100,000 sq. ft. per hr. in open areas and can be dumped by one man in about 30 sec. With speeds from 2 to 6 mph. and high maneuverability, it is said to be ideal for garages and storage areas.

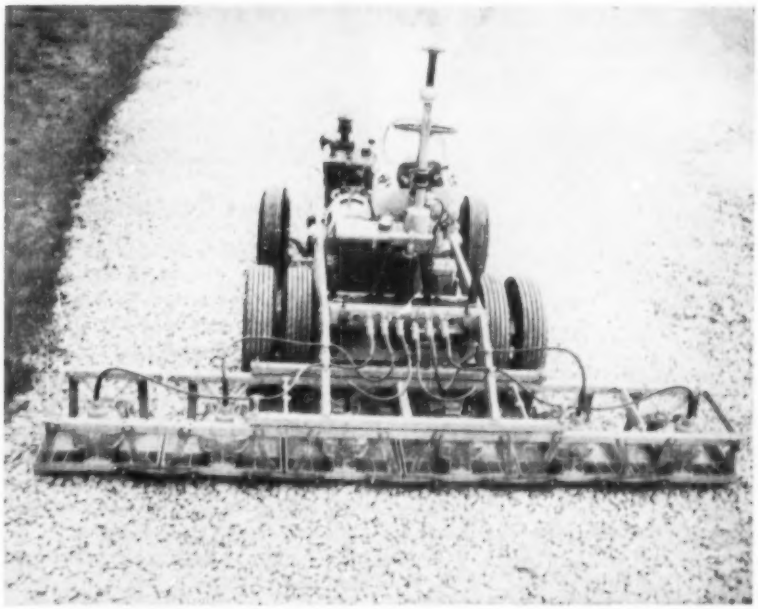
Machine holds up to 700 lbs. of dirt and is driven by a 7.3-hp. air-cooled gasoline engine. Drive is through a ⅜-in. pitch drive chain and hardened alloy-steel bevel gears.—**G. H. Tennant Co., 2566 N. Second St., Minneapolis, Minn.**—Bus Trans, Oct, p46

Company Offers New Land-Clearing Line

Backbone of land-clearing equipment line is a self-powered, mobile tree saw equipped with two extensible, maneuverable booms; a lower boom carries an electric-driven circular saw while an upper pusher boom directs the fall of the trees.

Also in the line is the LC tractor equipped with a special land clearing blade and a Tree Stinger with a telescoping boom used to pull or push over otherwise inaccessible trees.

The mobile saw, or Tournasaw as it is called, is driven by individual electric motors in each of the four wheels. Controlled placement of the sawblade not only allows the operator to use several angles of approach on one tree but also to cover more than 250 sq. ft. without moving the machine. Further, trees may be sawed off very close to ground level.—**R. G. Le Tourneau, Inc., Export Div., 24112 S. Mac Arthur, Longview, Texas**—Eng News-Rec, Oct 8, p257



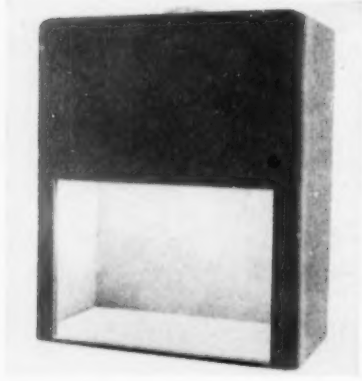
Compactor for Macadam Construction

On macadam base work, this machine in one pass will sufficiently compact 12 in. of rock to support smooth rollers. The rig consists of suspension of individual Jackson Vibratory Compactors. Working speeds from 0 to 60 ft. per min. are said to be ideal speeds. Width is 13 ft. 3 in.—Jackson Vibrators, Inc., Ludington, Mich.—Const Meth & Equip, Nov, p182

Assembly-Line Comparator

Producto Chek offers high accuracy and wide versatility at low cost, making it economically feasible to use for assembly-line checking. A lead screw on the column provides coarse adjustment and rapid positioning of the gaging head. Two fine adjustments then move the head slightly up or down and the dial scale from left to right for zeroing.

The head has a double-reed system, which eliminates gear trains, levers, racks, or pinions with the lag, backlash, and wear usually found in such dimension-checking systems.—**DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.**—Iron Age, Oct 1, p76



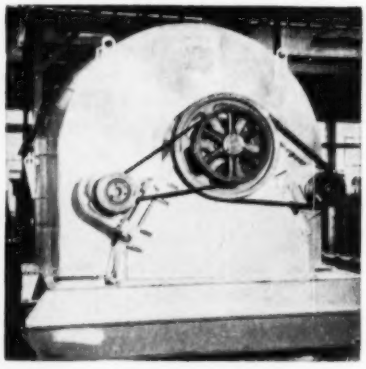
Simulates North-Sky Light

Portable color-matching light is designed for matching swatches and dyes and inspecting samples. Model provides simulated north-sky daylight. Artificial light (incandescent) is available for comparison purposes. Light operates on a.c. Cabinet size is 21 x 22 x 11¼ in.—Macbeth Daylighting Corp,. Newburgh, N. Y.—Textile World, Oct, p156

Powerful Pump Motors

Close-coupled pump motors are now available as high as 60 hp. designed specifically for use with centrifugal pumps. This motor, type SCB, eliminates shaft alignment or pump mounting problems by supporting pump on its U. S. National Electrical Manufacturers Association style "C" registered mounting bracket. A step shaft, with special diameter shoulder and tapped hole, for mounting impeller has all ground diameters for precision assembly and sealing against leakage past the shaft.

Grease lubricated ball bearings allow any angle positioning. A solid, closed flange on style "C" adapter bracket prevents entrance of pumped liquid into motor.—**U. S. Electrical Motors, Inc., Box 2058, Terminal Annex, Los Angeles 54, Calif.**—Elec C & M, Oct, p164



Continuous Centrifugal

Continuous centrifugal now being put through operating tests can save time, labor, and power consumption. Rated capacity of machine is expected to be twice that of present conventional centrifugal units.

Centrifugal incorporates vertical multi-baskets, alternately faced, running on concentric shafts and driven by V-belt transmission by two (15 and 10 hp.) general-purpose-construction motors.

Complete unit weighs 8,000 lbs. and occupies 120 sq. ft. floor space. Overall dimensions are: length, 12 ft.; width, 10 ft.; height, 9 ft.—**Hepworth Machine Co., 42-11 Ninth St. Long Island City, New York, N. Y.**—Food Eng, Oct, p185

NEW PRODUCT BRIEFS

Portable Testers—Model FM-100 conductivity meter makes absolute conductivity measurements of nonferrous conducting materials. Operator simply places hand probe on part and reads measurement on instrument dial. Uses include purity control in melting, sorting mixed metals, quality control in heat treating.—**Magnaflux Corp., 7300 W. Lawrence Ave., Chicago 31, Ill.**—Prod Eng, Nov, p216

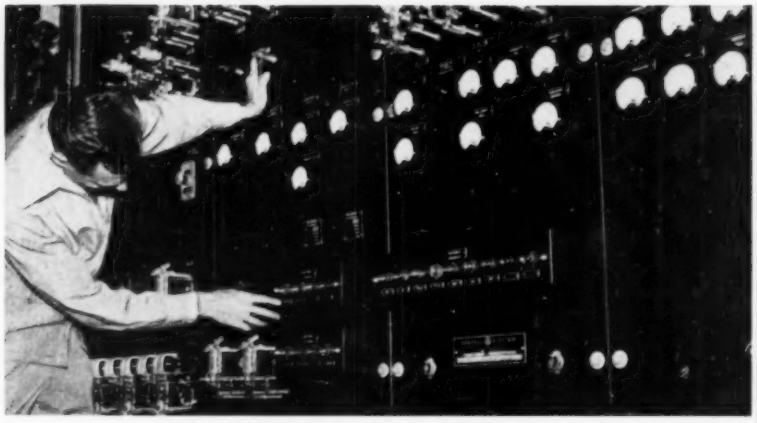
Sets Saw Teeth—Both rows of teeth on both sides of a saw are given a uniform set in one fast run through new automatic setter. A 26-in., eight-point saw can be set in 32 sec. Only three simple adjustments are needed for automatic operation.—**Foley Mfg. Co., 3300 Fifth St. N. E., Minneapolis 18, Minn.**—Am Builder, Sept, p202

Stock-chest Agitator—Side-Flow unit keeps pulp stock from sticking to sides of stock chest. It consists of a motor mounted in entering suction and coupled to an open impeller that throws entering stock outward so added weight at walls causes flow downward.—**Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.**—Paper Ind, Oct, p816

Projection Welder—Model EPT-2 is one of a series of three-phase projection welders available in 50, 75 and 100 kva. at 50% duty cycle. It also can be supplied as a combination projection and spot welder.—**Sciaky Bros., Inc., 4915 W. 67th St., Chicago 38, Ill.**—Weld Eng, Nov, p62

Wraps Terminal Wire—Stranded or solid wire can be wrapped around terminals with Wire-Wrench in single turn. Instrument is the size of a pencil and comes in two sizes WW 1 for miniature terminals, WW 3 for large terminals.—**Contact, Inc., 238 Main Street, Cambridge, Mass.**—Aviation Wk, Nov 9, p78

Propane Torch—Compact propane torch lights instantly at any temperature down to 30°F. below zero. Pencil-point flame develops 2,300°F. torch.—**Otto Bernz Co., Inc., Rochester, N. Y.**—Elec Whols, Nov, p13



ELECTRONIC FAULTFINDER is part of equipment in new tin-plate mill

It's New for Tin Plate

Electrical and electronic devices are helping produce more tin plate in western U. S. The fault finder and electrostatic oil sprayer are two of them

THE NEWEST and most modern tin-plate mill in the Western part of the U. S. is the Fontana, Calif., plant of the Kaiser Steel Corp. This mill, designed and constructed by Kaiser Engineers Division of Henry J. Kaiser Co., has some unusual electronic devices to speed up production and insure a uniform product.

Electrical equipment for the five-stand cold reduction mill used to reduce the thickness of the steel to tin-plate gage is so complex that a recently developed type of fault finder has been used to aid the maintenance man in the event of electrical troubles. Differing from the more common fault-finders in use today, this General Electric Co. device has a memory that helps solve one of the maintenance man's biggest headaches —the fault that occurs repeatedly but seems to cure itself each time, leaving no trace.

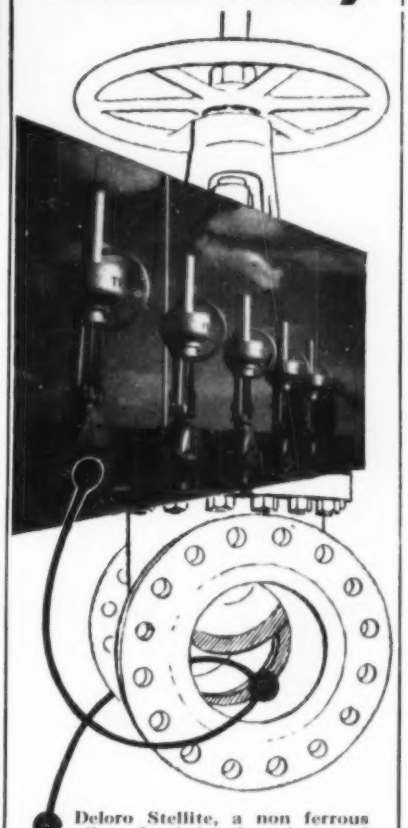
On this fault-finder, the fault location indicators are cold cathode gas-filled tubes. Under normal conditions the tube fires continuously. In the event of an open circuit, the firing of the tube stops, giving an indication of the location of the open circuit. The tube is extinguished until reset manually by the maintenance man. The cold-reduction-mill faultfinder is shown in its location on the variable voltage panel in the photograph.

Among other devices used at the Kaiser tin mill to assist in production and inspection are the flying micrometer, the X-ray gage, the beta-ray gage, and the pinhole detector.

Electrolytic tinning used in the Kaiser plant is especially interesting to the electrical field because of the high currents involved. The cleaning-section bus bar has a capacity of 15,000 amp. Pickling of the cleaned strip uses up to 31,000 amp. For plating, 12 generators supply 90,000 amp. Chemical treating of the tinned strip requires 4,500 amp. and the flow brightening of the tin plate requires up to 15,000 amp.

Electrostatic oiling has been successfully used at the new plant. Most tin plate must be shipped to the can companies covered with a film of oil for protection during storage and handling. On the Kaiser electrolytic line, oiling is accomplished by atomizing the oil by air pressure and electrostatically depositing a film on moving strip.—Elec West, Oct, p88

DELORO STELLITE stops wear-worry



Deloro Stellite, a non ferrous alloy of cobalt, chromium and tungsten, can make your mechanical parts last from 300% to 1000% longer when wear is caused by corrosion, abrasion, erosion or high temperatures: supplied as castings, as hard-facing rod and on leading manufacturers' equipment.

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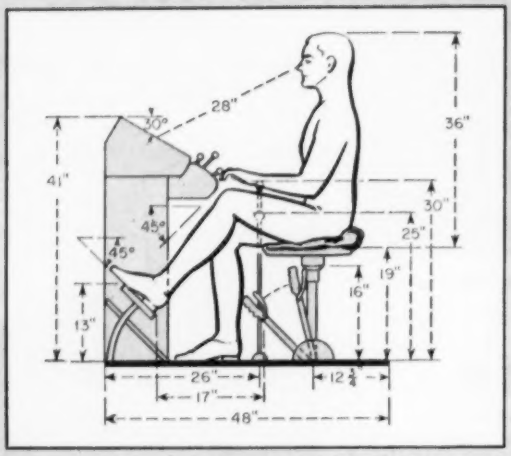
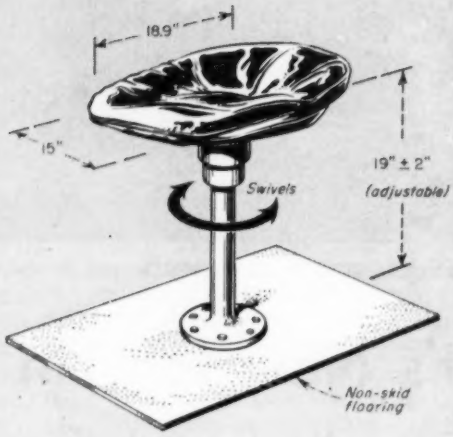


1 Centralizing controls and instruments at operating station makes equipment safer, operator more comfortable.



2 Adequate seating for the operator working long periods is most often overlooked, must be properly designed.

Fit the Machine to the Man

The human engineer is new on the industrial scene. His tools are analysis and a few tests. With these, he can tell you how to have the safest plant control

A RELATIVELY NEW SCIENCE called human engineering—fitting machines to people—is beginning to fill a need in industry. Based on the fact that technical developments are outdistancing people's ability to keep up with them, the human engineers are formulating guides for better machine design.

To show how the human engineer works in fitting a machine to the man, let's review what was done for a special type of pumping unit. This unit, mounted on a truck, pumps a sand-and-oil mixture at high pressures into oil wells to increase the porosity of the oil-bearing formation. To prevent damage to the well and to the unit itself, the operator must be alert constantly to the changing conditions. The unit runs 24 hr. a day under all weather conditions.

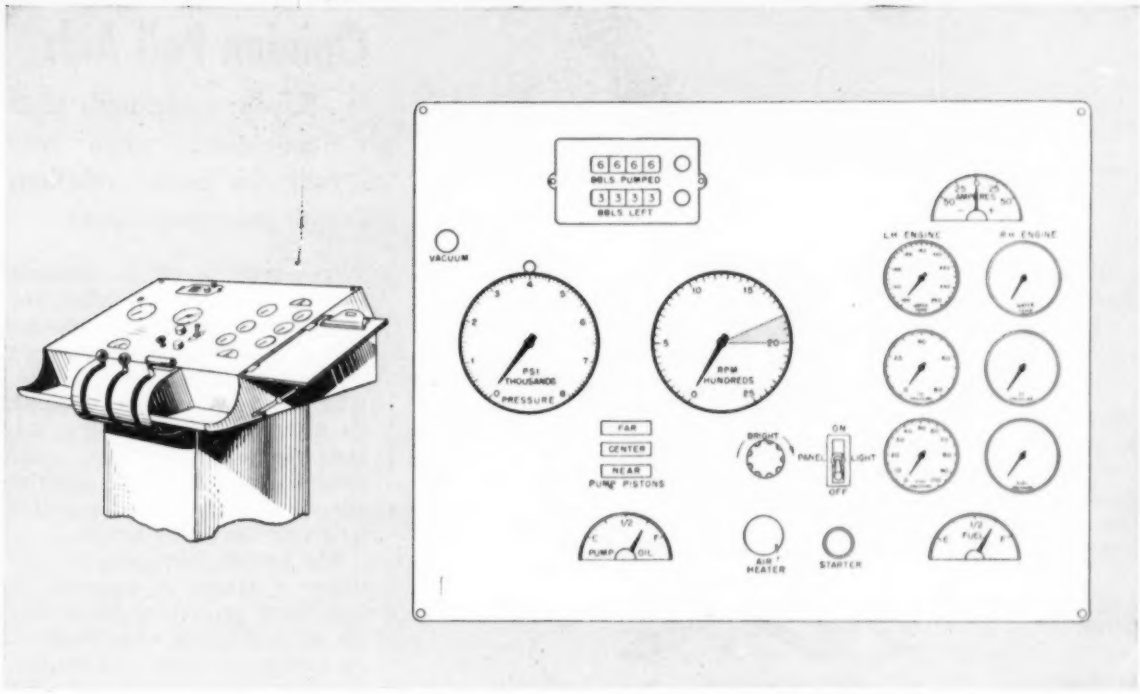
In the original design, the instruments and controls were arranged so the operator was forced to stand in awkward positions and turn around 180° in doing his work. About 20% of the time he had to divert his attention from important operating instruments. To avoid this, the controls and instruments were centralized, Fig 1 to 4.

In this control station, the throttles, clutches, and shift levers are grouped so the operator uses them without changing his position or taking his eyes off the main pressure gage. The seat is important. It is padded, adjustable in height, fully rotatable and made to fit the male adult.

Nonskid flooring, Fig. 2, perforated for drainage of oil, mud, and water, contributes to personnel safety. The operator is placed so that blowing heads or gaskets cannot hit him. Making the main pressure gage a relay, rather than a direct-reading gage carrying high-pressure fluid internally, reduces hazard to the operator. A detachable canopy and side curtains contribute to safety during inclement weather—a point often overlooked with equipment used outdoors.

Fig. 3 shows the operator's instrument console. The collapsible writing surface at the right edge facilitates keeping records. Control switch and knob are kept close to the associated instruments. The over-all tilt allows wide visibility without obstructing background objects or personnel.

Fig. 4 shows the instrument panel. Pump-performance indicators are grouped at the left, engine instruments at the right. Features of the panel are: (1) pressure gage



3 Operator's console provides easy reading of instruments.

4 Instrument panel groups instruments in logical order, gives prominence to most important indicators. Dial faces and layout utilize human-engineering.

and tachometer in most prominent position, (2) uniform zero position of all instruments, (3) horizontal rather than radial or tangential orientation of instrument letters and numerals, (4) clockwise increase of all numbers and moving pointers, (5) scales in units of five where practical, otherwise in units of 10, 50, or 100, (6) dial pointers of same or narrower width than markings and not overlapping markings, (7) all indicators clearly labeled, (8) dial lettering with stroke length to width ratio of 6:1 and height to width ratio 1:1, (9) edge lighting to eliminate glare and hot spots, to increase legibility, and to decrease operator fatigue and eyestrain, (10) rheostat to permit brightness control from 0.5 to 5.0 foot-lamberts on the dial faces as needed.

Reducing the number of instruments that an operator must read can sometimes simplify his job. An instrument is justified only when it contributes to decision making. Too often, instruments are kept on a control board after their original use is obsolete.

Sometimes instruments can be combined without increasing reading difficulty. One airline, for instance, found that fundamental information was given by the difference in reading of two separate instruments. By combining the instruments into one with two pointers, the operator had only to look at one meter for information. The instrument might have been further improved by a light that would function when the two variables failed to synchronize.

Much of human-engineering activity concentrates on improving existing control and display devices. A new trend is to look first at the need for the device before trying to improve it.

A great danger of automatic controls is that they require nothing of the operator and he is idle until an emergency arises. Then he must spring into action and do everything necessary within a matter of seconds. Having simplified controls that are nearly foolproof will sometimes spell the difference between success or failure here.

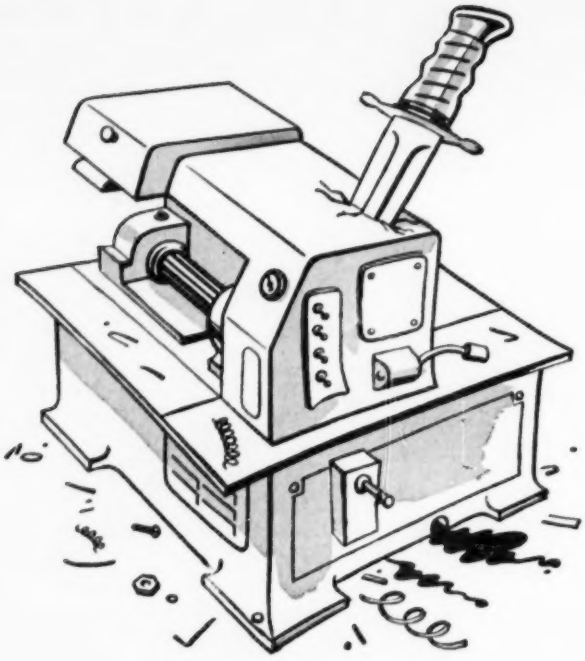
Color of instruments; color of panels; use of graphics; heights of instruments; relationship between switches, relays, protective devices; and measurement of important related variables—all figure into better control design, depending on the requirements.

Plant-instrument users demand meters of greater readability. But this represents only a surface attack on the problem. It is more important to find out what kind of information is needed in the first place and how valuable an effect the use of certain indicators will have on system performance.

System analysis has shown that improvement in individual meters without regard to the entire system is not successful. Actually, it is sometimes damaging. It is necessary to analyze the man-machine system as a whole to determine both the need and value of specific improvements—Power, Nov, p84

Separates, Destroys Insects

New apparatus for killing insects in grain consists of a framework suspended by flexible members. Within the frame are sets of super-imposed screens and channels. Circular or gyratory motion of the frame as grain pours on it from a chute agitates the grain kernels. As the grain moves toward the discharge, insects fall through the screen into channels containing freely moving metal balls. Ball movement crushes the insects.—Food Eng, Nov, p165



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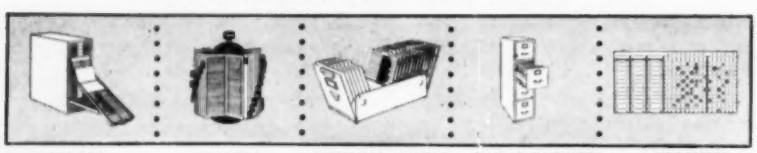

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Opinion Poll Aids

. . . your company's communications when you look for better relations with your employees

YOU CANNOT MAKE an employee opinion poll a success unless you "sell" it to the employees in the beginning and "share" the program with employees from start to finish. With this in mind, B. F. Goodrich Co. told all its employees that Science Research Associates would come in and conduct an objective and anonymous survey, and that they would know the results.

The survey then gave the employee a chance to comment on just about everything concerning his job and future with Goodrich. As soon as the results of the survey were known, employees were told the score.

The first report to all employees was published a little less than 2 months after the survey had been conducted. Two full pages in the employee magazine, *Circle-News*, were taken by the report. A big headline, "Here's What Office Employees Think About Their Jobs and the Company," made it impossible for any reader to miss the results.

Results were given on all the findings; since numerous questions had been asked, they added up to quite a bit of information. In addition to the usual questions, all employees were asked for their opinions about twelve Goodrich policies, services, or programs.

Most of the critical comments indicated to management exactly where it had failed to provide clear-cut information on many programs. Others felt that certain programs or systems were sound in principle, but operated poorly.

Goodrich's next step was to tell its employees just what was going to be done about many of their constructive criticisms. Within a few months, Goodrich had made good on all employee criticisms.

Thus the opinion poll paid its way by bringing closer communication between employee and management.—Am Business, Oct, p26

MANAGEMENT REPORT

Ever since the war, the Kansas State Highway Department has been unable to keep enough graduate civil engineers on hand for state highway work. Now the department thinks it has solved its problem. It has a plan to obtain engineers from Mexico by means of "scholarships."

The idea will help Kansas fill its vacancies and, at the same time, provide practical training for engineers of countries willing to participate in the plan. In addition to the Mexicans, the department also will employ a British engineer. And as the plan develops, it is hoped that engineers from other countries will be included.—Eng News-Rec, Sept 17, p68

Excessive absenteeism caused production bottlenecks and lowered efficiency at Arthur Kahn Co., textile converters. Maybe you recognize the problem. Here's how Kahn solved it.

A simple, workable plan provides employees a half-day credit for every month of perfect attendance. At the end of the year, the employee having 12 credits has earned either 6 days leave, in addition to his regular vacation, or 6 days extra pay. Results: last year 60% of Kahn's employees had perfect attendance records and employee morale had improved.—Am Business, Oct, p46

What makes a small company succeed? Analysis of some of the most financially sound small companies shows they have these common features: close inventory control, disposal of excess facilities, proper maintenance, and good accounting practices.

They refuse to tie up capital in raw materials beyond requirement. They make full use of motion-study techniques, flow process charts, and mechanized materials handling. If a line produces profits too low, they get rid of it and find new uses for the equipment. They keep machines working by good maintenance. And if they have to borrow money, they can provide the bank accurate, complete financial statements.—Am Mach, Nov 9, p153

Alert managements will watch closely the trend to use of radioisotopes in industry, which within the last year has forged ahead of medicine and agriculture as the largest user. More than 740 industrial firms now employ radioisotopes for radiographic testing, thickness gaging, and similar jobs.

Cost-cutting advantages and product-improvement opportunities by using radioisotopes are many, according to information released in November at the National Industrial Conference Board's atomic-energy conference. Here is one striking example: Mr. D. C. Brunton, president, Isotope Products, Ltd., of Canada told how one rubber company has reduced thickness variations to one-third by use of beta-gage measurement.

There is nothing like visible proof when you are trying to stamp out waste and costly errors in an industrial plant. Nelson Stud Welding Div., Gregory Industries, Inc., proved this when it pulled $4,000 worth of "lost," and "dead," and special-order surplus welding studs from its warehouse during the annual inventory period.

A display of factory, office, and shipping errors was set up alongside the time clock and snack bar as a daily reminder to the plants employees. Within 3 weeks scrap was sharply reduced.—Am Business, Sept, p47

Profit-sharing plans can cause trouble if they are not handled properly. So says Dr. Marcus Nadler, consultant and economist for the Hanover Bank, New York. He says further that schemes to share a company's earnings with all employees may have built-in dangers.

First, a plan that is not tightly constructed to show up—by definite measures of achievement—a better-than-average effort by individuals or departments may come to be considered simply a general bonus. Eventually, employees will consider it part of their base pay. Then it loses its incentive.

Second, a time may come when there are not enough profits to share. Employees may not understand this. They will consider they have taken a pay cut.

Dr. Nadler suggests that profit-sharing be avoided unless there is some way to (1) pinpoint contributions to the company's benefit by employees or their departments and (2) explain clearly to employees how profits and losses are made.—Business Wk, Oct 31, p182

Talent pools—interdepartmental panels of experts—are helping Boeing Airplane Co.'s manufacturing research unit solve tooling and process problems. The research unit is divided into groups, each made up of specialists in one field. When a group gets an assignment, it first finds out if the problem has ever been solved—at Boeing or elsewhere.

If not, the group leader appoints a panel of experts from other interested departments in the division. The panel serves as an advisor during development of a new process or tool. Its job: to be sure that an apparently sound production process will not result in a part with manufacturing "bugs."—Factory, Nov, p242

PRODUCTION IDEAS

from Manufacturers' Catalogs

Floor Care—Pamphlet titled "Millions of Square Feet of Floors Without Flaws" lists ways to maintain all types of floors, whether they are soft or hard-surface.—A. C. Horn Co., Inc., Long Island City, N. Y.

Plant Engineering—Fertilizer plant design is the subject of a new two-color bulletin covering facilities of the Dorr Company, Engineers.—The Dorr Co. Inc., Barry Place, Stamford, Conn.

Office Machine—Pamphlet DM1183 introduces new multiple-total adding machine and lists a number of innovations designed to make your office work faster and more efficient.—Burroughs Corp., Detroit 32, Mich.

Cutting Machine—Dual-Column Cutter is the subject of folder DC-7500-9-51. Machine is designed for volume cutting on sheets, plates, or slabs of ferrous metals, nonferrous metals, composition materials, and plastics.—American Machine & Foundry Co., 481 Fifth Ave, New York 17, N. Y.

Heavy-media Separation—Thirty-two page booklet gives the latest information on this process for mineral concentration. Advantages and specific uses of heavy-media separation are covered with text and pictures.—American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.

"Foundromatic" Shakeouts—Construction features of "Foundromatic" shakeouts in types and sizes to meet the foundry's particular requirements are described in a new 20-page bulletin 07B6365B. Units covered include capacities from 3,000 to 8,000 lb. and from 8,000 to 300,000 lb.—Allis-Chalmers Mfg. Co., Export Dept., Milwaukee 1, Wis.

Packaging Machines—Colorful booklet I Sp 30. 1299. BD contains wide variety of machines used for packaging many consumer products. This folder is available in Spanish.—Industrie-Werke Karlsruhe Aktiengesellschaft, Karlsruhe, Germany

Vertical-boom Ditcher—Bulletin 44C describes the special uses for general-purpose ditcher. Some of the applications covered: grave digging, water main work, and farm drainage. Smaller Runabout service ditcher also included.—Barber-Greene Co., Aurora, Ill.

Dual-drum Paver—Specifications and construction of Model 34E Dual-Drum Paver are subject of 28-page bulletin R-1700-B8. Each part of the paver is illustrated and explained.—Worthington Corp., Harrison, N. J.

Hose and Couplings—New book gives complete data on the construction, use, and purchase of hose and couplings. Also included are a table on coupling selection, data tables on pressures and threads, and charts on pipe and flange sizes.—Hewitt-Robbins. Buffalo 5, N. Y.

Diaphragm Valves—Catalog sv-1951 describes uses for the diaphragm valve wherever corrosion, abrasion, contamination, clogging, leakage, and maintenance are problems.—Grinnell Company Inc., 347 Madison Ave., New York 17, N. Y.

Laundry Washers—Design and construction of the Cascade unloading washer are the subject of folder AB 334-322. Features of the washer are fully illustrated and described.—The American Laundry Machinery Co., 40 E. 34th St., New York 16, N. Y.

Glass Doorways—Uses of new glass doorways to blend with modern architecture are covered in booklet G91175.-20M.9-49. Specific installations and general use of glass doors are illustrated.—Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh 19, Pa.

Loose-leaf Binders—New 40-page booklet illustrates uses for 20 different loose-leaf binders. "Rem-Bossed Process" is new method used for printing, embossing and personalizing each binder.—Remington Rand Inc., 315 Fourth Ave., New York 10, N. Y.

Motor Controller—Electronic adjustable speed drive called Mot-O-Trol is described in booklet DB-18-110-1. Mot-O-Trol is especially valuable in paper, textile and machine-tool industries.—Westinghouse Electric International Co., 40 Wall St., New York 5, N. Y.

Car Spotters and Pullers—These devices that move railway cars of all types—singly or in trains—are the subject of catalog 2092. Other industrial uses of spotters and pullers are also covered.—Link Belt Co., 2680 Woolworth Bldg., New York 7, N. Y.

Versatile Farm Tractors—Folder E-11-C pictures three Farmall tractors and their special-duty equipment that includes everything from post-hole digger to power duster.—International Harvester Export Co., 180 N. Michigan, Chicago 1, Ill.

Protective Relays—New and expanded edition of "The Art of Protective Relaying," (GET-1768A), contains information on types of relays used for protecting such apparatus as generators, transformers, transmission lines.—International General Electric Co., 570 Lexington Ave., New York 22, N. Y.

Plastics—Pamphlet "Properties and Uses of Geon Polyvinyl Materials" describes the many uses of vinyl elastomers in industry. It includes extrusion film and sheeting, coatings, molded products, and rigid materials.—B. F. Goodrich Chemical Co., 2060 E. Ninth Street, Cleveland 15, Ohio.

Suitcase and Trunk Locks—Catalog 61 of the Eagle Lock Company presents a complete reference of suitcase and trunk locks. Additional section in back of the book gives information on miscellaneous hardware.—Bowser International Inc., Graybar Building, 420 Lexington Ave., New York 17, N. Y.

Time Systems—Leaflet 188 covers automatic time stamps, watchman's clocks, payroll recorders, master clocks, and steel card racks. Equipment is designed for use by industry, schools, hospitals, hotels, and office-building installations.—Simplex Time Recorder Co., Gardner, Mass.

Plastic Spray—Uses for new-type vinyl-plastic spray is the subject of file sheet #7/23D/24. Properties, applications, specifications of the Plasti-Spray process are also covered.—Progressive Industries, Inc., 48-08 Van Dam Street, Long Island City 1, N. Y.

Diesel Engines for Railroads—Vertical, air-cooled "in line" engines ranging in output from 130 to 270 bhp. and vertical air-cooled "in line" and V-type engines ranging from 100 to 150 bhp. are examined generally in folder D 158 E. Specifications for Models AM 517 (water-cooled) and AL 514/614 (air-cooled) are also listed.—Klockner-Humboldt-Deutz AG, Cologne, Germany.

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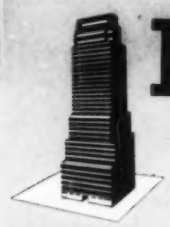

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2. **Stoughton, Butts, and Bounds—ENGINEERING METALLURGY, 4/ed., 463 pages, 1953 ..... $8.25**
   This treatment for non-metallurgical engineering students covers broadly the structure, properties, treatment, and working of metals and alloys, with emphasis on the use rather than the production of metals. The principles basic to the proper selection of metallic materials in engineering design and construction are presented.

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   A simple, non-mathematical treatment of the basic principles the radio technician requires to install and service television receivers. All elements, from the antenna to the picture tube, are clearly and thoroughly described.

5. **Rossi—WELDING ENGINEERING, 786 pages, 1953 ..... $8.75**
   A concise, accurate book on processes, weldability, design and fabrication techniques, and testing and inspection of welds. Cold welding, contact-arc and multiple-arc welding, stud, induction, and flow welding are helpfully and logically treated by the author.

6. **Sell—ENGLISH-PORTUGUESE COMPREHENSIVE TECHNICAL DICTIONARY, 1168 pages, 1953 ..... $37.00**
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   This useful new book provides the means and techniques for successful selling of any kind. The fundamentals are discussed step by step and the reader is given helpful guidance in developing a positive sales personality.

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9. **Baker—INTRODUCTION TO STEEL SHIPBUILDING, 2/ed., 388 pages, 1953 ..... $6.75**
   This revised treatment presents the basic reasoning and practices of ship construction and design as well as a survey of the techniques and materials used. The basic principles of powering and propulsion are treated in a unified manner.

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Here's Another Magazine We Digest

Electrical Appliances

Electrical Merchandising might well be called the glamour magazine of McGraw-Hill. Its large size of 10⅞ × 13½ in., its smart layout, and its emphatic use of color make it a welcome visitor each month to more than 37,000 retailers and distributors of electrical appliances, radios, and television sets.

But these readers look for more than size, layout, color. They look for sales ideas that will stimulate the movement of electrical products from manufacturer to distributors and dealers, and then on to the ultimate consumer. So the main emphasis of the magazine is directed to the retail level of distribution.

Editorial coverage, month by month, includes analyses of successful retail promotion, sales and advertising practices; data on hiring, training, and compensation of sales personnel; store location and planning; window and floor display techniques; modern methods of accounting, inventory, and cost control; the profitable operation of service departments; analyses of the market potential of newly introduced products; and profit possibilities in associated or sideline merchandise. But the principal emphasis is on actual experience articles describing successful methods of moving merchandise.

Lawrence Wray, editor, believes that fundamental to all distributive activities is the knowledge of markets. So the magazine presents each year a complete report on the U. S. sales and saturation of various types of equipment.

Surveys of individual markets throughout the country supplement the national statistics. Also published are market studies of all appliance and radio-TV industry product sales by units and dollar volume, saturation, public acceptance, seasonal sales factors, geographic sales factors, percentage of trade-ins involved, replacement and obsolescence data.

The January issue will present the annual report. Preliminary figures for 1953 indicate substantial increases in the sales of many products. In 1952, for example, 720,000 electric water heaters were sold; 1953 shows an increase of 16% for a total of 835,000. For electric ranges, 1,060,000 were sold in 1952 and 1,372,000 in 1953 for a 29% increase. Air-conditioner sales have boomed from 341,000 in 1952 to 800,000 in 1953 —a startling 135% increase.

Also given in the report will be the retail sales values for all such products, showing that their U. S. retail market value is over $6-billion.

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330 W. 42nd St., New York 36, N. Y.
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Aviation Week
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Chemical Week
Coal Age
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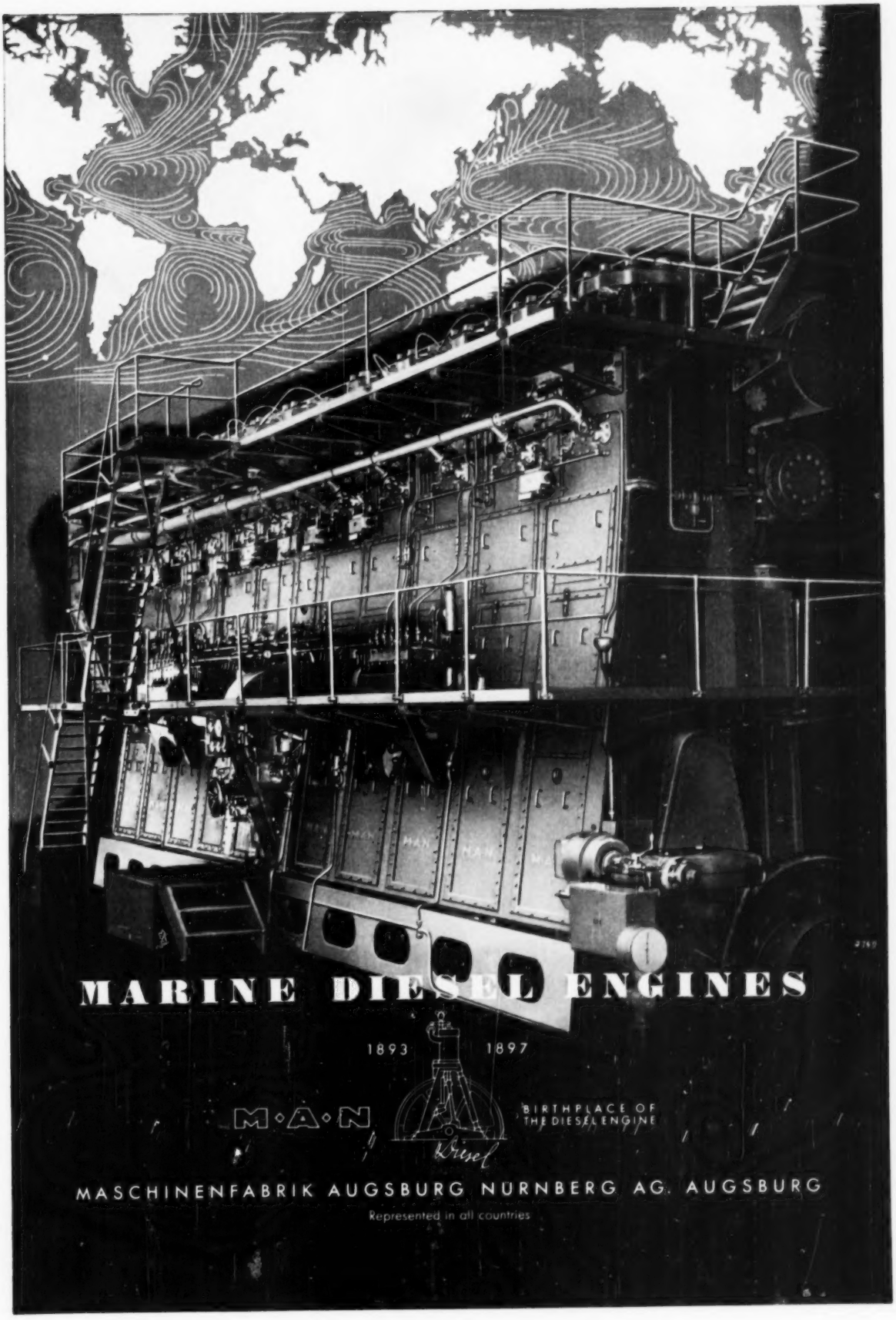
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